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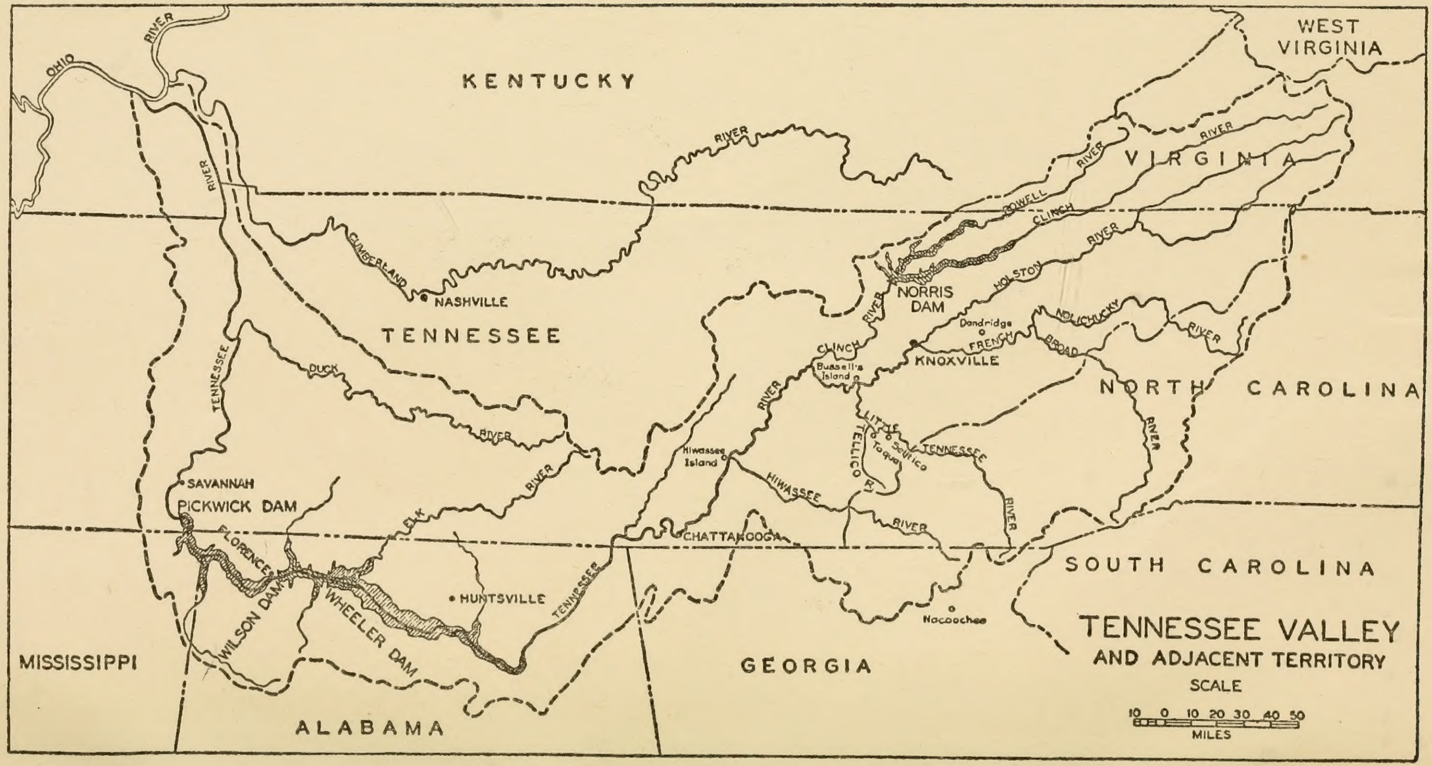
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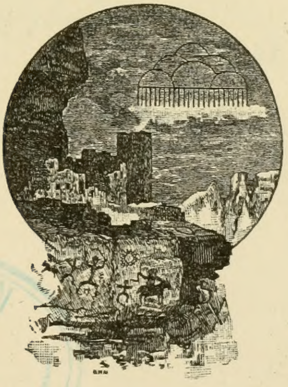
SMITHSONIAN INSTITUTION
BUREAU OF AMERICAN ETHNOLOGY
BULLETIN 129

AN ARCHEOLOGICAL SURVEY OF PICKWICK BASIN IN THE ADJACENT PORTIONS OF THE STATES OF ALABAMA, MISSISSIPPI AND TENNESSEE

By
WILLIAM S. WEBB AND DAVID L. DeJARNETTE

WITH ADDITIONS BY
WALTER B. JONES, J. P. E. MORRISON
MARSHALL T. NEWMAN AND CHARLES E. SNOW
AND WILLIAM G. HAAG



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LETTER OF TRANSMITTAL

Smithsonian Institution,
Bureau of American Ethnology,
Washington, D. C., June 10, 1940.

Sir: I have the honor to transmit herewith a manuscript entitled "An Archeological Survey of Pickwick Basin in the Adjacent Portions of the States of Alabama, Mississippi, and Tennessee," by William S. Webb and David L. DeJarnette, and to recommend that it be published as a bulletin of the Bureau of American Ethnology. The funds for the publication of this report have been made available by the Tennessee Valley Authority.

Very respectfully yours,

M. W. Stirling, *Chief.*

Dr. C. G. Abbot,
Secretary of the Smithsonian Institution.

LETTER OF TRANSMITTAL

KNOXVILLE, TENN., *January 5, 1940.*

SIR: Submitted herewith is a manuscript entitled "An Archeological Survey of Pickwick Basin in the adjacent portions of the States of Alabama, Mississippi, and Tennessee," prepared by Maj. William S. Webb, senior archeologist, Social and Economic Research Division, and David L. DeJarnette, curator of the Alabama Museum of Natural History.

Plans for the study of the Pickwick Basin were made in 1935. Field work was begun in 1936 and carried on through 1938 under the supervision of Major Webb and Mr. DeJarnette, with the assistance of junior archeologists in the Social and Economic Research Division. A labor force provided by the Works Progress Administration was utilized in the excavation of the sites. The facilities of the State Works Progress Administration Archeological Laboratory at Birmingham were also made available for this study, and the Alabama Museum of Natural History has cooperated at all stages of the project.

The report is the third of a series drawn from archeological studies collected in areas to be flooded for reservoir purposes. The first two publications in this series have appeared as Bulletins 118 and 122 of the Bureau of American Ethnology, Smithsonian Institution.

Very respectfully yours,

LAWRENCE L. DURISCH,
Chief, Social and Economic Research Division,
Tennessee Valley Authority.

MR. EARLE S. DRAPER, *Director,*
Department of Regional Planning Studies,
Tennessee Valley Authority, Knoxville, Tenn.

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AN ARCHEOLOGICAL SURVEY OF PICKWICK BASIN IN THE ADJACENT PORTIONS OF THE STATES OF ALABAMA, MISSISSIPPI, AND TENNESSEE

By William S. Webb and David L. DeJarnette

INTRODUCTION

It has long been known that prehistoric man often chose to make his habitat in the immediate vicinity of large streams. There were many very potent reasons why he should do this. Streams permitted travel by canoe, so that inhabitants of a village on the bank of a stream had a very distinct advantage over those located inland. The stream dweller not only could travel to distant points with comparative ease, but in a canoe he could transport a load of goods weighing several hundred pounds more easily than by any other means at his command. The same stream which afforded him these advantages of travel and transportation also brought friends, traders, hunters, and strangers past his door—travelers all. These were the means of communication and trade which the aborigine had with the world of his day. Small wonder, then, that often he should have sought to build his home on the bank of a stream. When the stream was a great river such as the mighty Tennessee, the prehistoric dweller on its banks was living beside a great highway. Along this highway flowed a stream of trade and travelers; sometimes war parties of friendly tribes or of dangerous and powerful enemies passed by on their way to make history of their day. All these powerful agencies caused shifts in population and operated always in the direction of diffusion of culture and in the spread and interchange of information, customs, and material things.

If it be remembered that the ecological conditions of the river region developed an abundant food supply of varied sorts, the overwhelming advantage of a habitat on the immediate bank of a stream is easily manifest. Not only were fish and shellfish in great abundance in a wide range of species in prehistoric time, but wild rice and other vegetal foods grew in abundance along river banks. These sources of food also attract a variety of water fowl: ducks, geese, and many other species—all were potential food for the river dweller.

These advantages caused the earliest occupants of the Tennessee Valley to concentrate their dwelling along the river banks, and as centuries passed, such occupancy produced quite a varied and considerable archeological record along the Tennessee River.

With the determination of the Tennessee Valley Authority to build a dam at Pickwick Landing on the Tennessee River near Savannah, Tenn., there came the recognition of the scientific obligation: to study the prehistoric remains to be found in the region to be inundated; to recover, as far as possible, the record of occupancy of these prehistoric peoples; and to preserve to posterity such evidences of their material culture as still remained available on these sites. Thus, an archeological survey of the region was undertaken under the direction of the Social and Economic Research Division of the TVA, in cooperation with the University of Alabama through its Museum of Natural History. The first purpose of the survey was to locate and describe briefly all archeological sites within the limits of the basin to be formed. The second purpose was to excavate such of these sites as opportunity offered in order to save information and material before the region should be inundated.

PICKWICK LANDING DAM

The Pickwick Landing Dam was authorized November 19, 1934, and was completed and closed February 8, 1938, at which time the reservoir started to fill. The dam is located on the Tennessee River in Hardin County, Tenn., 15 miles up the river from Savannah, Tenn., some 8 miles above the Shiloh National Park, and about 207 miles above the mouth of the Tennessee River.

This great dam has a total length of 7,715 feet. This includes two earth embankments totaling 5,659 feet, and 2,056 feet of concrete construction which contains the lock, spillway, and powerhouse. The dam is 113 feet high and designed to raise the level of the lake, when completely filled, to the 418-foot contour. The reservoir area thus formed is 48,500 acres water surface at the spillway. This dam backs water up stream 53 miles to the foot of Wilson Dam and provides a 9-foot navigation channel upstream to lock No. 1 at the lower end of the Florence Canal 3 miles below Wilson Dam.

The reservoir volume at low-pool level (408-foot elevation) is 416,000 acre feet, and when completely filled at maximum elevation (418 feet) its total volume is 1,032,000 acre feet. Thus, this variation of lake level of 10 feet between the 408- and the 418-foot contour provides a volume of 616,000 acre feet for flood control. Plate 1 presents a view of Pickwick Basin in the vicinity of Brush Creek Island above Waterloo, Ala. The 418-foot contour, the basin edge, is shown by the timber line on the distant hills beyond the river. Within the basin much timber grew along the river bank, about the edges of sloughs and small lakes, and on the islands in the river. All this timber was cut and the brush piled for burning as shown in the foreground. Before inundation, the basin was thoroughly cleared of trees, fencing, houses, and all under-water obstructions.

Since the area to be investigated in the archeological survey includes the area actually flooded and the marginal area within 4 feet of elevation above the lake level, the area to be investigated in this survey was something more than 75 square miles lying in Hardin County, Tenn.; Tishomingo County, Miss.; and Colbert and Lauderdale Counties, Ala.

Some time before the beginning of this survey, the Alabama Museum spent two summer seasons in locating sites along the Tennessee River in northern Alabama. This work was done through a grant from the National Research Council which provided expenses for field parties other than salaries. Thus, a larger number of sites in Lauderdale and Colbert Counties, Ala., already had been located and described. All this information was made available for the purpose of this investigation.

A location survey for all archeological sites in the basin to be formed was made in 1936. This was done by R. D. Silvey, party chief from the Survey Section of the Engineering Service Division, TVA. Under his direction a thorough field search for archeological sites was made throughout the area to be flooded. Each site was described and classified, and its location plotted on the precise aerial mosaic of that region, scale 1 inch = 1,250 feet. The intent was to produce so accurate a location of every known site that, if need be, its exact location could be recovered—even after inundation for many years had caused silt to cover over the site. As the result of this location survey, a total of 323 sites were recorded as follows:

Hardin Co., Tenn	49
Tishomingo Co., Miss	40
Colbert Co., Ala	116
Lauderdale Co., Ala	118
Total	323

After the completion of the field work of this survey, the Engineering Service Division of TVA prepared a final report in June 1937.

In this report of the survey, George D. Whitmore, Chief of the Survey Section, TVA, explained how the location of inundated sites might be recovered as follows:

> The ground location of each site is preserved for all time through a plane (rectangular x and y) coordinate system. This particular system extends over the western half of Alabama, was developed and published by the United States Coast and Geodetic Survey in 1934, and is known as the Alabama (west) transverse mercator projection. The central or reference meridian for this coordinate system is on longitude 87°30′00″ west, latitude 30°00′00″ north, and has plane coordinate values of x (east) 500,000.0 feet and y (north) 0.0 feet. This plane coordinate system is used as the computing and plotting basis for practically all

of the surveys and maps of the Authority. The plane coordinate projection lines appear also on the planimetric base maps of the area. A full description of this and similar State plane coordinate systems is available in Special Publications 193 and 195 of the United States Coast and Geodetic Survey, entitled "Manual of Plane Co-ordinate Computation," and "Manual of Traverse Computation on the Transverse Mercator Grid," respectively, procurable from the United States Government Printing Office, Washington, D. C., or from the Authority's library.

The coordinate position of each archeological site was obtained by scaling x and y coordinates of the approximate center of each site. The coordinate position thus is just as accurate as the original plotting and subsequent scaling will permit. Since the aerial mosaic on which the sites were plotted and scaled is on the scale of 1 inch = 1,250 feet and since the probable accumulation of error for mosaic compilation, plotting, and scaling may be assumed as not likely to exceed about $\frac{1}{10}$ inch, then the probable coordinate accuracy of each site is about $\frac{1}{10}$ of 1,250 or approximately 125 feet.

To recover in the future the under-water location of any archeological site, it is only necessary for the surveyor to know the coordinates of the site desired, together with the coordinates of some nearby identifiable point on the shore. From the x and y differences between the coordinates of the site and the nearby recoverable point, it is a simple matter to compute a bearing and distance from the recoverable shore point to the archeological site. Setting a transit or surveyor's compass on the shore point, setting off the required bearing to the archeological site, and measuring the proper distance along that bearing gives the location of the desired site. Such over-water distances may be measured either by stadia, by small triangles from a measured base on the shore, or by prolonging two bearings from two shore points to their intersection.

There are innumerable coordinate positions available along and near the shore of Pickwick Reservoir. Any building, fence intersection, road point, or other similar object which appears on the aerial mosaic and which is in existence at the time of the future survey, constitutes such a recoverable coordinate point, the coordinates being obtained by scaling from the mosaic or map on which the point appears. In addition, there are numerous concrete survey monuments along the reservoir property-boundary line, and monuments marking silt-measuring ranges, whose exact coordinate positions are known from transit-tape surveys. Further instructions regarding the use of plane coordinates in recovering obliterated or lost points can be found in standard surveying text books, or in Special Publications 193 and 195 referred to above.

The final report of the survey contains:

1, General *index map* of the reservoir (folded, scale 1 inch = 1 mile) showing the planimetric map (see item 4) sheet boundaries and numbers, and also the location and type of each archeological site found, with its index number.

2, Tabulated *index*, giving aerial-mosaic sheet number on which site is plotted, kind of site, approximate size of site, top and base elevations, and plane coordinates of center.

3, Descriptive *field notes*, typed on standard form, the sheets being arranged progressively upstream from Pickwick Dam.

4, Photostat reductions of *planimetric maps* (reduced to scale 1 inch = 4,000 feet) showing the exact location of each site; and by symbol the kind of site, whether village, shell mound, etc. (The locations of the sites were transferred to the planimetric maps from the original field-plotted aerial mosaics, and show much more information as to the site location and features of the surrounding area than is afforded by the general index map.)

Six copies of the report of this survey were prepared and deposited as follows:

One copy in the files of the Engineering Service Division, TVA, Chattanooga, Tenn.

One copy sent to the Engineering Report Files, TVA, Knoxville, Tenn.

One copy deposited with the Bureau of American Ethnology, Washington, D. C.

One copy deposited with the Chairman, Committee on State Archaeological Surveys, Division of Anthropology and Psychology, National Research Council, at Ann Arbor, Mich.

One copy deposited with the Museum of Natural History, University of Alabama, Tuscaloosa, Ala.

One copy used as a work copy for guiding exploration in the field and in the preparation of this report.

By this compilation of information and distribution of copies it was intended to preserve for all time the record of the location and description of every archeological site found in the basin.

The second objective of this survey—the excavation of selected sites—was begun on May 4, 1936. Supervision was provided by the Tennessee Valley Authority and the labor was from the Engineering and Construction Division of the Works Progress Administration under the sponsorship of the Alabama Museum of Natural History. This arrangement continued in operation till the flooding of the basin on February 15, 1938. Later, after Federal approval of a new Statewide archeological project under the direction of the Womens' and Professional Research Section of WPA sponsored by the Alabama Museum of Natural History, work was continued on marginal sites which were only partially submerged, but the contents of which would soon be destroyed by the high-water table. This work was continued to the spring of 1939.

During this period of 20 months before the basin was flooded, some 19 sites were excavated more or less completely. The names of these sites with their designations, and the names of the supervisor in charge of each site, are presented in the following list. The sites have been arranged in order by counties going upstream. A map of Pickwick Basin is presented as map 2 in this report. This map shows the location of only those sites which were excavated.

LIST OF EXCAVATED SITES

Name	Site	Supervisor
McKelvey Mound	Hn° 1	J. L. Buckner, T. C. Page, and T. Johansen.
Fisher Mound	Hn° 4	J. L. Buckner and W. G. Haag.
Boyd's Landing	Hn° 49	T. Johansen.
Smithsonia Landing	Lu° 5	J. R. Foster.
Seven Mile Island	Lu° 21	J. R. Foster.
Perry Site, Unit 1	Lu° 25	J. R. Foster.
Perry Site, Unit 2	Lu° 25	H. V. Anderson.

Name	Site	Supervisor
Colbert Creek Mound	Lu^{o} 54	J. R. Foster.
Bluff Creek Site	Lu^{o} 59	Chas. G. Wilder, W. G. Haag, and B. C. Refshauge.
O'Neal Site	Lu^{o} 61	B. C. Refshauge.
Meander Scar	Lu^{v} 62	B. C. Refshauge.
Wright Mound, No. 1	Lu^{o} 63	D. L. DeJarnette.
Wright Mound, No. 2	Lu^{o} 64	J. R. Foster, W. G. Haag, and B. C. Refshauge.
Wright Village	Lu^{v} 65	W. G. Haag.
Long Branch Site	Lu^{o} 67	W. G. Haag and D. L. DeJarnette.
Union Hollow	Lu^{o} 72	T. Johansen.
Koger's Island	Lu^{v} 92	B. C. Refshauge.
Mulberry Creek	Ct^{o} 27	J. R. Foster.
Georgetown Landing	Ct^{o} 34	D. L. DeJarnette.
Georgetown Cave	Ct^{o} 42	J. R. Foster.

ACKNOWLEDGMENTS

Much of the success of the field excavations undertaken in this survey depended on the ability, initiative, and industry of the field-party supervisors. Acknowledgment of indebtedness is made to the following men for efficient service: in the able management of field parties; in the careful conduct of excavations; and in the efficient preparation of records and reports. This supervision required long hours in the field beyond the normal working day, the assumption of responsibility for the safety of working crews, as well as careful management to take advantage of changes in weather conditions, changes in river level, available labor supply, etc.

Over these 20 months covering two winters on the Tennessee River, work crews were transported thousands of miles by trucks and hundreds of miles by boat without any serious damage to life or limb, without any damage to private property, and with no loss of Government property. This is in itself a demonstration of the efficiency of the individual field-party supervisors.

LIST OF SUPERVISORS

Harold V. Anderson, Archeological Supervisor	WPA.
John L. Buckner, Junior Archeologist	TVA.
James R. Foster, Junior Archeologist	TVA.
William G. Haag, Junior Archeologist	TVA.
Theodore Johansen, Archeological Aid	TVA.
Tate C. Page, Archeological Aid	TVA.
Bernard C. Refshauge, Junior Archeologist	TVA.
Charles G. Wilder, Junior Archeologist	TVA.

Our acknowledgment of services is due the Alabama Museum of Natural History for fullest cooperation and aid. The Museum, under the direction of Dr. Walter B. Jones, rendered many services during this survey, among which may be mentioned:

1. Making a preliminary survey of sites in Colbert and Lauderdale Counties, Ala.
2. Loan of tools and equipment for work parties.
3. Aid in transportation of men and material.
4. Use of the Central Archaeological Laboratory at Birmingham.

During the summer of 1938, the Alabama Museum placed at the disposal of the authors the service of the Central Archaeological Laboratory at Birmingham. Skeleton restoration and the preparation of the material from Pickwick Basin was undertaken at the laboratory. The authors had opportunities to study, classify, and photograph the material for this report. The entire laboratory force, under the efficient supervision of Miss Marion Dunlevy, was used for some 4 months in processing the material from Pickwick Basin. These and many other services the Alabama Museum has rendered to the project.

Acknowledgment is made to the National Works Progress Administration for various grants of funds to provide labor for field parties. Except for such grants it would not have been possible to conduct such extensive excavations on so many important sites. With the cooperation of Dr. Vincenzo Petrullo, archeological consultant, WPA., the Central Archaeological Laboratory was established. This laboratory, as indicated, has rendered a varied and important service in the compilation of data for this report.

Acknowledgment is due the National Research Council for a grant of funds in 1936 to aid in the coordination of the supervision furnished by TVA and the labor furnished by WPA in the archeological projects on the Tennessee River. A portion of the grant—about one-third of the total—was spent on coordinating the work of the various agencies in this basin. Such funds play a very necessary part in perfecting a field organization and meeting the necessary minor expenses which lay outside the ability of the governmental agencies to consider.

The authors are deeply indebted to a number of scientists who have made special studies in their respective fields—of problems directly connected with the archeological survey of Pickwick Basin—and who, as the result of such studies, have prepared papers which are included in this report.

Dr. Walter B. Jones, director of the Geological Survey of Alabama, has written a chapter on the geology and topography of this region, the understanding of which is basic to an understanding of the archeology of the region.[1]

Dr. J. P. E. Morrison, Division of Mollusks, United States National Museum, came to the basin in December 1937, and took samples of shells, by foot levels, from many deep shell middens. These samples were the basis for the study which Dr. Morrison has made on "Mollusks Found in the Shell Mounds of the Pickwick Landing Basin." His report is presented herein (pp. 337–392) as a valuable addition to this survey.

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[1] See section on geology in this report entitled "Geology of the Pickwick Basin in adjacent parts of Tennessee, Mississippi, and Alabama," by Walter B. Jones (p. 372).

William G. Haag, of the University of Kentucky, has prepared a chapter on the pottery of Pickwick Basin. His study is presented herein under the title "A Description and Analysis of the Pickwick Pottery" pp. (393–507).

Marshall Newman, of Harvard University, during the summer of 1938, spent some 3 months in the Central Archaeological Laboratory at Birmingham in supervising the restorations of skeletal material. After his return to duty at Harvard University the skeletal restoration was continued under the direction of Dr. Charles E. Snow. Together they have prepared the paper included herein under the title "Preliminary Report on the Skeletal Material from Pickwick Basin, Ala." (pp. 509–526).

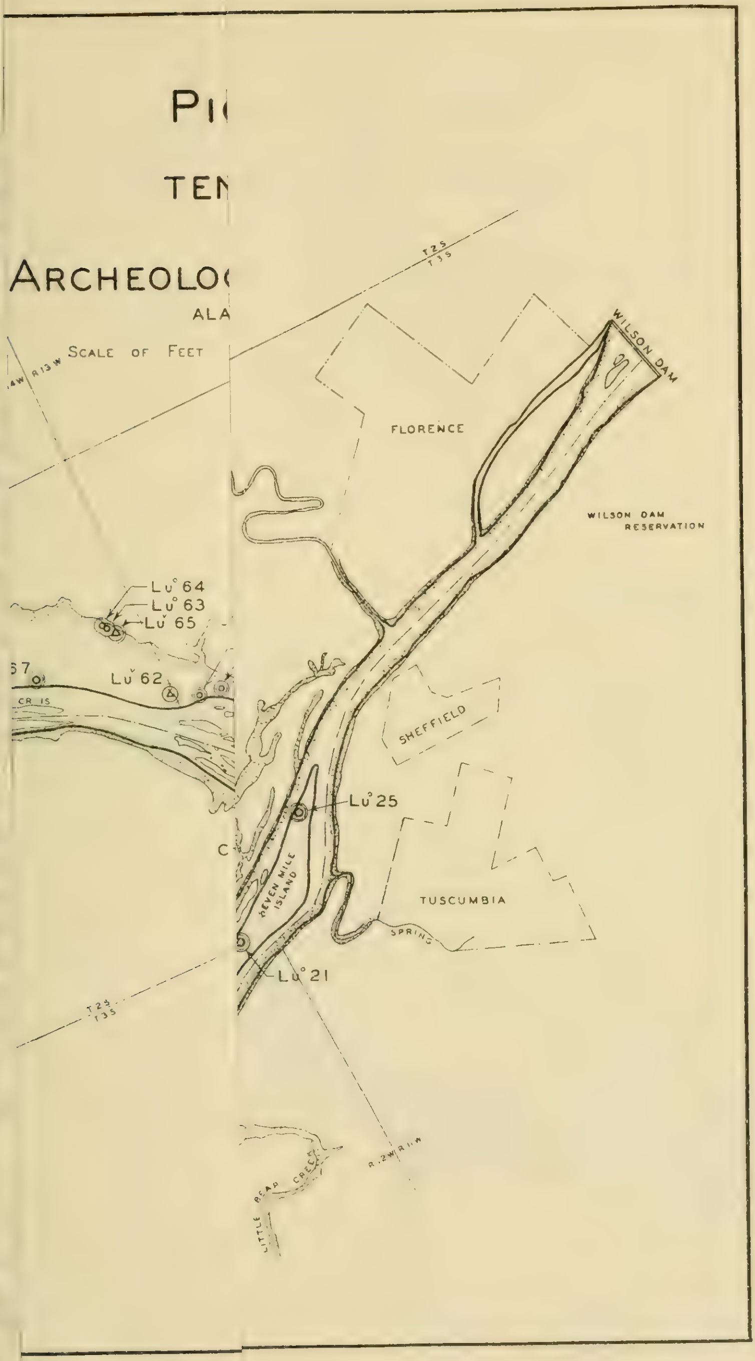
The authors wish to express their appreciation of the service of the United States National Museum. Through the kindness of Frank M. Setzler, the Museum has assisted in making identification of a number of specimens and has been helpful in advice and consultation on problems arising during this survey.

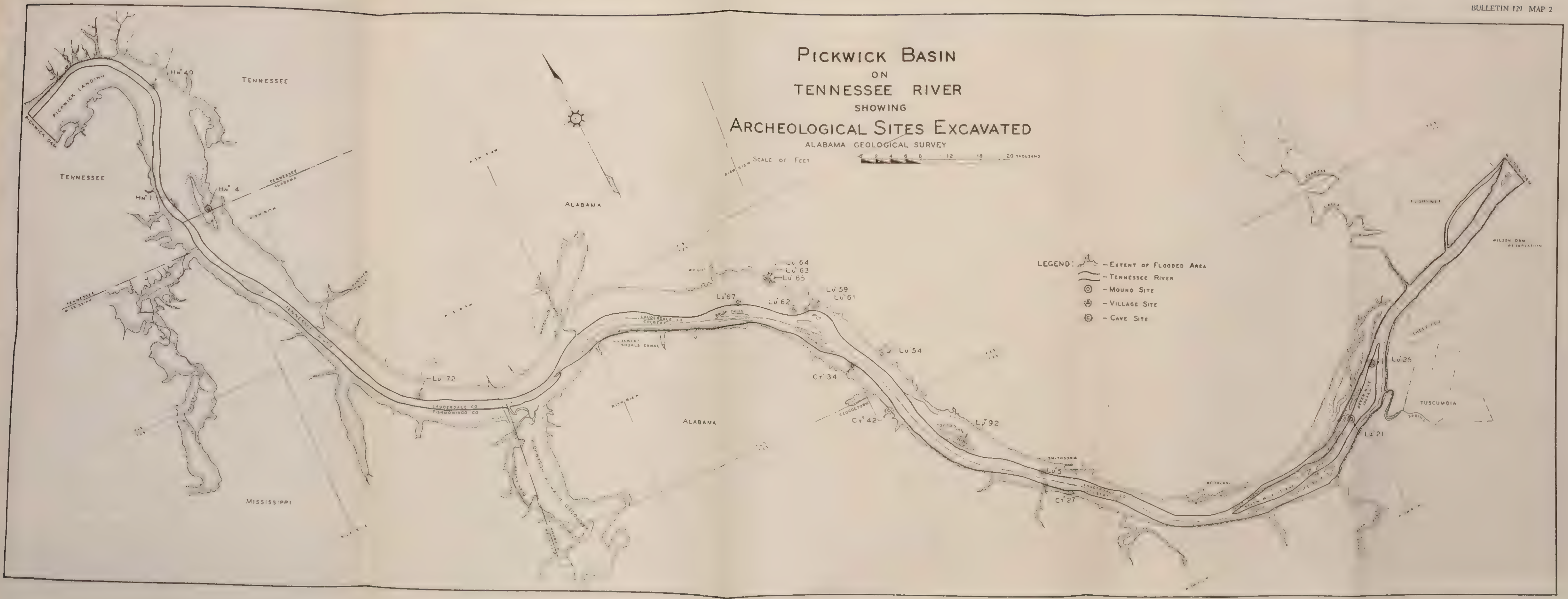
In order to study the flint material for this basin, James R. Foster, junior archeologist, TVA, devised the classification system used in this study. A note of explanation of this system may aid the reader to understand the significance of the finding.

A Note on the Classification of Flint from Pickwick Basin

The flint classification used in this report was designed for classification of all chipped-stone material used in the manufacture of projectile points and knives. A study of the Pickwick Basin projectile points reveals the use of a wide variety of materials; chalcedony, jasper, chert, conglomerate, quartzite, and several grades of flint were common through the basin; obsidian was not found in any site.

The classification used in this report was created especially for the forms, or types, of projectile points occurring in the region of the Pickwick Basin. The typing of this material was largely subjective. A specimen was classified as it appeared to resemble or differ from an already established type. The comparison of the specimen with the type form was made by the same individual throughout the entire study. In this way it was hoped to keep a type as near its original forms as possible. The method of procedure in developing this classification was to start with the material on the first site and to give the first specimen handled the first type number. The next specimen that differed from this was given the second type number. The types were separated into five general divisions. These were:


Pi
TEN
ARCHEOLO
ALA
Scale of Feet
R 13 W
T 2 S
T 3 S
FLORENCE
WILSON DAM
WILSON DAM RESERVATION
Lu° 64
Lu° 63
Lu 65
57
Lu 62
CR IS
SHEFFIELD
Lu° 25
C
SEVEN MILE ISLAND
TUSCUMBIA
SPRING
Lu° 21
T 2 S
T 3 S
R 2 W R 1 W
LITTLE BEAR CREEK


PICKWICK BASIN
ON
TENNESSEE RIVER
SHOWING
ARCHEOLOGICAL SITES EXCAVATED
ALABAMA GEOLOGICAL SURVEY
SCALE OF FEET
0 2 4 6 8 12 16 20 THOUSAND
LEGEND:
– EXTENT OF FLOODED AREA
– TENNESSEE RIVER
– MOUND SITE
– VILLAGE SITE
– CAVE SITE
TENNESSEE
TENNESSEE
ALABAMA
ALABAMA
MISSISSIPPI
PICKWICK LANDING
PICKWICK DAM
Hn° 49
Hn° 4
Hn° 1
TENNESSEE
ALABAMA
TENNESSEE RIVER
Lu° 72
LAUDERDALE CO
TISHOMINGO CO
LAUDERDALE CO
COLBERT
COLBERT SHOALS CANAL
Lu° 67
Lu° 64
Lu° 63
Lu° 65
Lu° 62
Lu° 59
Lu° 61
Lu° 54
Ct° 34
GEORGETOWN
Ct° 42
Lu° 92
SMITHSONIA
Lu° 5
Ct° 27
LAUDERDALE CO
COLBERT
WOODLAND
SEVEN MILE ISLAND
Lu° 25
Lu° 21
TUSCUMBIA
SPRING
WILSON DAM RESERVATION
FLORENCE

1, Stemless points; 2, stemmed points; 3, notched points; 4, blanks; 5, drills. Stemmed points were further divided on the basis of the stem into three groups: *a*, Stem with parallel sides; *b*, stem contracting toward the base; and *c*, stem expanding toward the base. As originally conceived, it was contemplated that the kind of stone, the size, and the flaking would be considered in the determination of types. Use showed these criteria to be impractical, so form was selected as the dominant element in the classification. Size and the type of flaking necessarily influenced some types but the factor of material was eliminated completely.

This classification system was not completely satisfactory since, owing to the progressive nature of the study, many of the problems did not arise until the classification had been in use for some time.

The primary purpose of the classification was to give a standard by which data on projectile points at one site could be compared with similar data from another site. This was especially important in stratigraphical studies. For this purpose it was satisfactory.

A length of 6 centimeters was chosen as a dividing line between the long and the short projectile points.

The most serious criticism which could be made of this classification system is that the range of variation within any given type may be considered too great. This may be true but this classification is justified by the practical necessity of attempting to prevent the number of types from being so excessive that it would be useless.

It will be seen from a study of the flint on any particular site that the majority of projectile points fall into a few types while there are a great number of types represented by a very few specimens. Certain types were undoubtedly very distinctive; such types as type 46, the small triangular point commonly referred to as the "Mississippian point," or type 5, the Copena point. The shell-mound material was generally quite varied and could only be classified under a great number of types. While the range in any one type may have been large, still these types were definite enough to expose a definite stratigraphy in the shell middens.

DETAILED REPORT OF THE SITES EXCAVATED IN PICKWICK BASIN

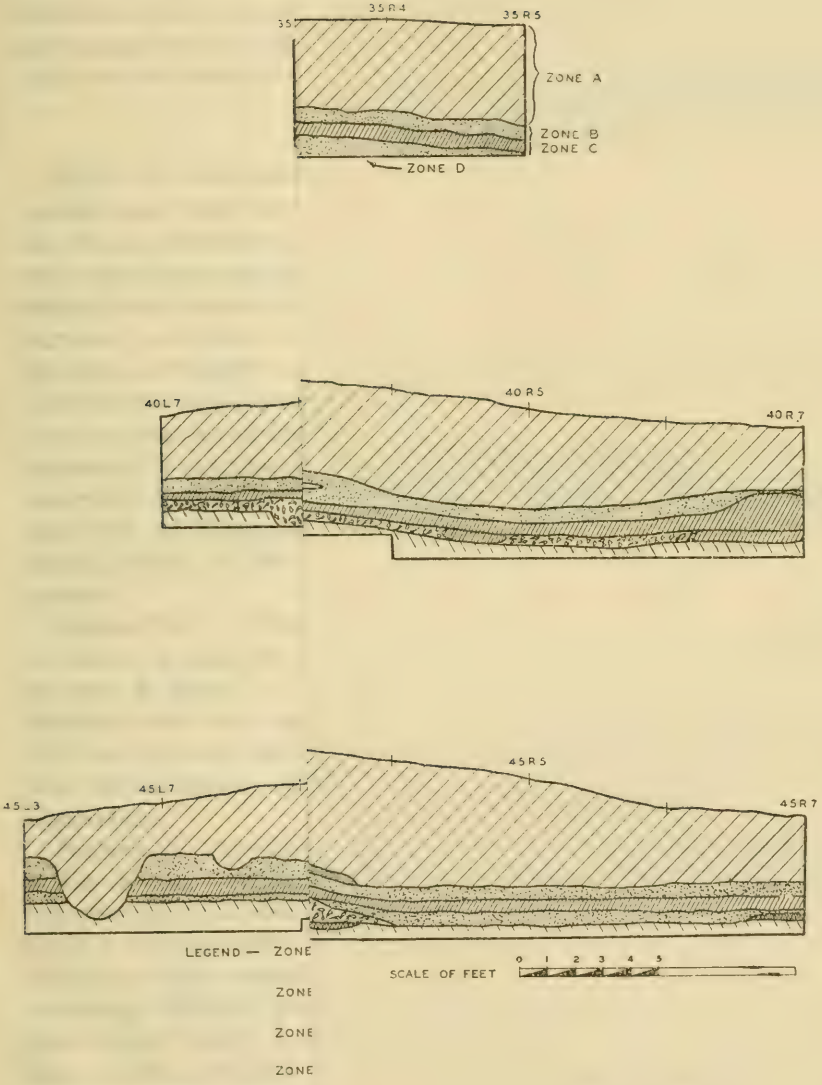
McKELVEY MOUND, SITE Hn° 1

This site was an earth mound on the immediate (right) bank of the Tennessee River in Hardin County, Tenn. It was 3,000 feet north of the Alabama State line on land previously owned by J. M. McKelvey. The site is about a half mile northwest of site Hn° 4. The mound on the top was composed of a very sandy loam. It was about 100 feet in diameter and appeared to rise about 8 feet above the level of the river terrace on which it rested. The river bank at this point sloped steeply to the river which at low water was about 40 feet below the level plateau. This very fertile river terrace, which was nearly 2 miles wide at this point, extended back to a line of low-lying cliffs. This river bottom had long been cultivated, and the immediate vicinity of the mound had recently produced crops of corn and sorghum. Prior to the time the Basin Clearance Division of TVA cleared the river bank of its timber, the mound was covered with a grove of cypress trees—as shown by the stumps visible in plate 2, figure 1.

Because of these trees—the roots of which fairly well covered the mound surface—cultivation of the mound itself had not been possible. It was, therefore, not much eroded and probably had never been much higher than at the time of excavation. In very recent times a portion of the immediate top of the mound had been used as the site for a tenant house. The occupancy had been terminated by the burning of the building. The surface of the mound thus yielded modern crockery, scraps of metal, and the usual debris of a farm yard. This material was all quite superficial and recent; it presented no problem in separation since there was no appreciable infiltration to lower levels.

The mound was cleared and staked in the usual 5-foot squares, and excavation was begun on the upstream side far enough from the mound to be certainly beyond mound structure. These preliminary trenches were put down to undisturbed soil and at that level carried into the mound until mound structure was reached. It was apparent that the mound was constructed as a site for a house—a town house, or perhaps a dwelling. Two, well developed, occupational levels in the body of the mound fully explain the main purpose of its construction. It was not, therefore, primarily a burial mound, although many burials were made in it as will be explained.

From the first it was apparent that the mound had been erected on an old village site which was shown by a black heavy humus layer containing potsherds, animal bones, and the usual village-midden material. At this level were numerous fire-burned, hard-baked areas. Some of these areas were covered with charcoal, and several areas were covered with charred cane. As excavation continued toward the center, it was apparent that on this old village level there had been a considerable shell heap which represented an accumulation of midden debris. This shell layer also had potsherds included in it, together with animal bones and occasional artifacts. This shell layer, deepest under the center of the mound, is well shown in plate 2, figure 2, which presents the 35-foot profile. Above this shell layer, the sandy loam of the mound had been brought in as shown by evidence of normal loading in the profiles. This sand had been carried in from the immediate vicinity and was fairly uniform in appearance, but the humus content differed slightly from top to bottom. This soil is so


35
35R4
35R5
ZONE A
ZONE B
ZONE C
ZONE D
40L7
40R5
40R7
45L3
45L7
45R5
45R7
LEGEND — ZONE
ZONE
ZONE
ZONE
SCALE OF FEET
0 1 2 3 4 5

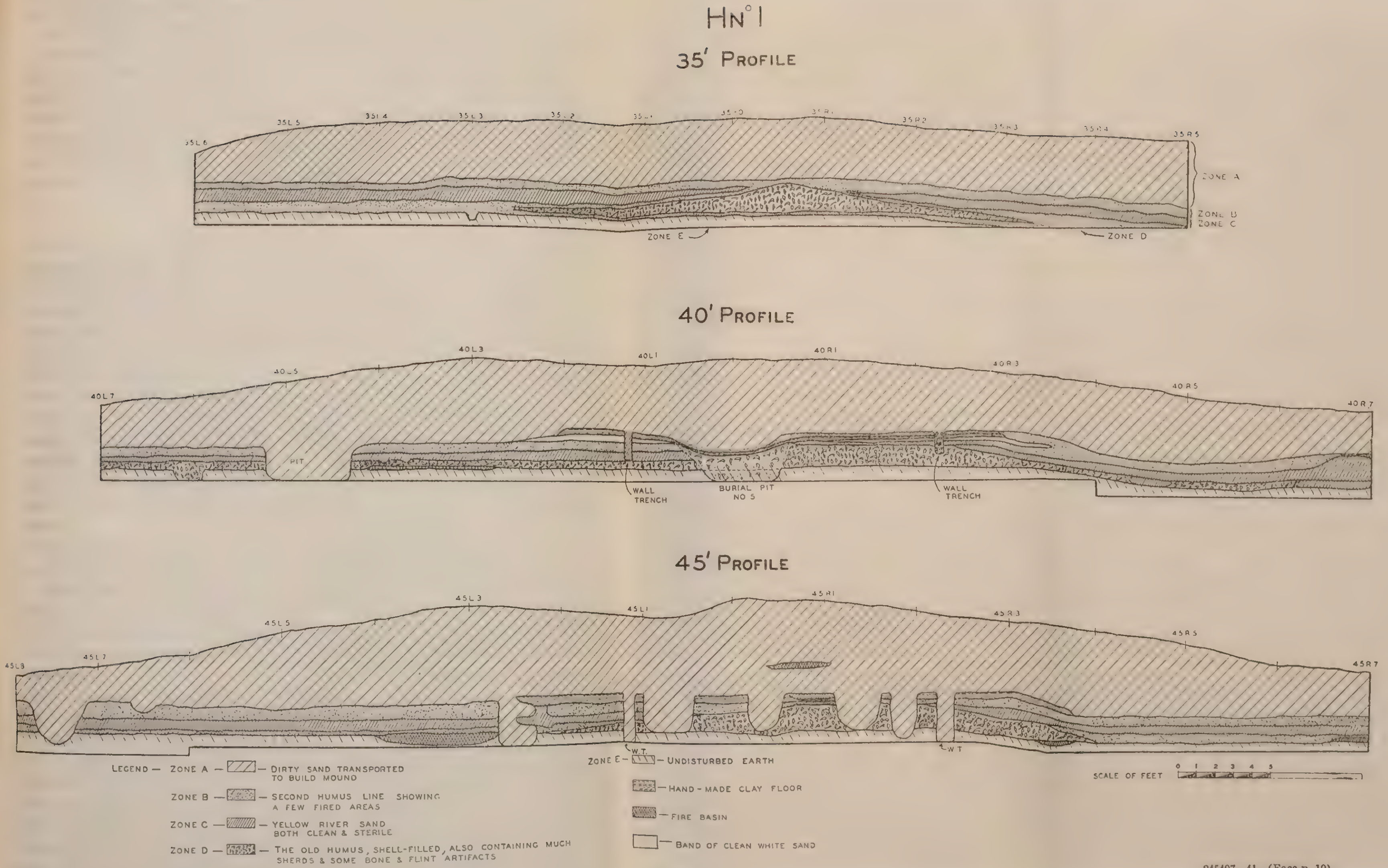

Hn°1
35′ Profile
35L6
35L5
35L4
35L3
35L2
35L1
35-0
35R1
35R2
35R3
35R4
35R5
Zone A
Zone B
Zone C
Zone E
Zone D
40′ Profile
40L7
40L5
40L3
40L1
40R1
40R3
40R5
40R7
PIT
WALL TRENCH
BURIAL PIT NO 5
WALL TRENCH
45′ Profile
45L8
45L7
45L5
45L3
45L1
45R1
45R3
45R5
45R7
W.T.
W T
Legend — Zone A — Dirty sand transported to build mound
Zone B — Second humus line showing a few fired areas
Zone C — Yellow river sand both clean & sterile
Zone D — The old humus, shell-filled, also containing much sherds & some bone & flint artifacts
Zone E — Undisturbed earth
— Hand-made clay floor
— Fire basin
— Band of clean white sand
Scale of feet
0 1 2 3 4 5

Figure 1.

easily penetrated by water that seepage lines were beginning to form along the slopes of the mound which indicated that a considerable redeposit of silt within the mound was in process at all times.

As excavation proceeded, the earth removed was carried in wheelbarrows to the river brink and dumped. This easy disposal of the earth permitted the examination of a considerable area of the old village under the mound slope. At one time this village probably extended far beyond the boundary of the mound to the adjacent cultivated fields. However, due to cultivation and erosion there was no evidence of the village in the cultivated fields. Test pits outside of the mound area failed to pick up evidence of any occupancy.

FEATURES

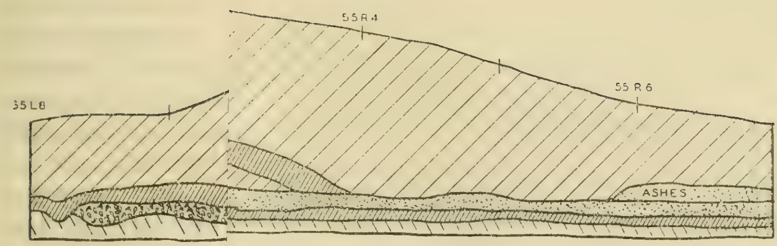
Within the area excavated, which included practically the whole mound area, there were 37 special features listed as belonging to the old village occupational level. These features were fire-burned areas, crude fire basins made of clay brought onto the site, occasional unrelated post molds, a few pits which possibly were used for storage purposes, and areas covered with ashes, charcoal, bone, and shell. All of these features seem to point to a considerable density of occupancy of this small area before the mound was built. The excavation of these features yielded material which will be reported herein, but because of the similarity of such features they have not been described separately in detail. The mound was built by carrying sandy loam upon the old village site without removing the shell layer. In the mound proper, of the 28 features found, only three were of special interest.

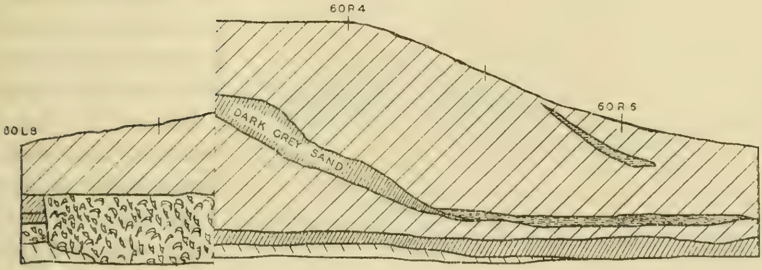
Feature No. 11.—This was a sandstone human effigy found lying on its side at a depth of 3.5 feet below stake 45R3. It is shown in situ in plate 5, figure 1. Nearby were sherds of a crushed pot and a charcoal area with some scattered animal bones and animal jaws. It is not certain that this material was an intentional association with the sandstone effigy. There was no burial and no burial pit in association.

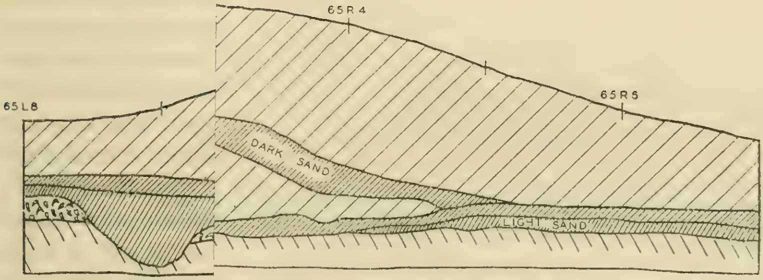
Feature No. 20.—This was a prepared clay floor which was revealed in the 40-foot vertical profile, as shown in plate 4, figure 1. This occupational level was about 18 inches above the midden layer of shell. On it a clay floor about 25 feet by 28 feet had been laid down. This clay floor, which was about 6 inches thick, was of a light gray color and distinctly different from the earth of the mound fill. It appeared that at this level a house had been built, and after its construction the clay floor was laid both inside and outside the walled structure, since the space occupied by the wall was not covered with this clay, but appeared as a rectangular trench. That portion of this floor which was within the 35-foot cut was cut away before it was decided to uncover this floor horizontally in order to obtain a photograph. This floor is partly shown in plate 4, figure 2. The clay of this floor was pressed close to the structure walls both inside and outside and while soft was probably puddled and pressed or pounded into shape. In the center of the structure a considerable area was hard burned by the action of fire directly upon it. There was no definite fire basin in this structure. Five large pits had been cut through this house floor. These extended into the shell occupational level below. These pits were doubtlessly used for burials, and during the occupancy of the structure it is probable that the clay floor over these pits was replaced. However, excavation of this site revealed that before this level of occupancy was deserted and the building destroyed, these pits were again opened and most of the bodies removed. It is possible that this almost complete removal of bodies may have been a hasty one. In any case the pits were refilled with the material which had originally been in them. The earth was full of shell and midden debris. The clay floor was not replaced after this apparent second opening of these pits. Thus the position of these pits appeared as discolored and depressed areas in the house floor which at once suggested burial pits. These pits are shown in plate 4, figure 1. Plate 4, figure 2, shows the 60-foot profile with these pits completely excavated. The floor of this structure was reasonably smooth and had once been covered with split cane stalks which had left very definite impressions in the clay due to tramping about on top of the cane while the clay floor was soft. Plate 7, figure 2, shows such impressions. The relative position of this floor in the mound is shown in figure 1, which presents drawings of the 35-, 40-, and 45-foot profiles.

It will be observed that in plate 4 the unexcavated mound appears flat in its immediate vicinity.

In cutting down the 45-foot profile, there appeared a clay layer at a depth of about 18 feet from the surface. This clay layer was irregular but much harder than the sandy loam in the mound above and below it and suggested the possibility of a floor. It was determined to uncover it horizontally to discover and photograph any structure or occupational level which might be revealed as excavation proceeded. By taking the sandy loam down to this clay layer, the layer was revealed as irregular in surface, sloping slightly to the center, and showed no evidence of use as an occupational level. However, a number of shallow burials were found in this section of the mound above this clay layer. This clay layer was certainly intentionally laid, but for what purpose may be a question. It is believed that a possible explanation may be found in the fact that the body of the mound erected of sandy loam eroded very easily. Such a hard, well-compacted, clay cap even though somewhat rough on the surface, would certainly have greatly assisted in keeping the comparatively


55R4
55R6
55L8
ASHES


60R4
60R6
60L8
DARK GREY SAND


65R4
65R6
65L8
DARK SAND
LIGHT SAND

LEGEND – Zo

Zo

Zo

Zo

SCALE OF FEET 0 1 2 3 4 5 10

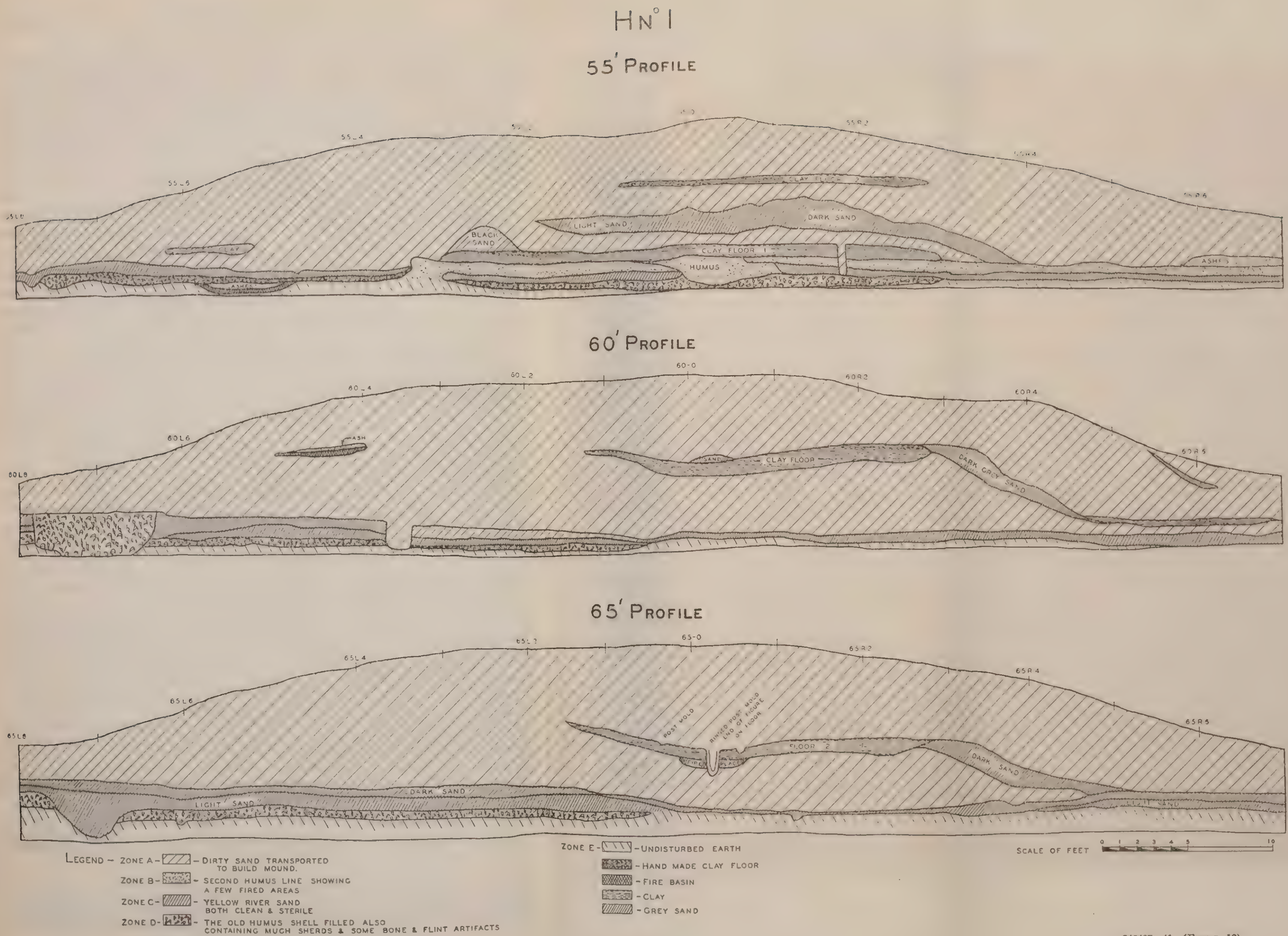

HN°I
55′ PROFILE
55L8
55L6
55L4
55L2
55-0
55R2
55R4
55R6
CLAY FLOOR 2
LIGHT SAND
DARK SAND
BLACK SAND
CLAY
CLAY FLOOR 1
HUMUS
ASHES
ASHES
60′ PROFILE
60L8
60L6
60L4
60L2
60-0
60R2
60R4
60R6
ASH
SAND
CLAY FLOOR
DARK GREY SAND
65′ PROFILE
65L8
65L6
65L4
65L2
65-0
65R2
65R4
65R6
POST MOLD
RINGED POST MOLD END OF FIGURE ON FLOOR
FIRE PLACE
FLOOR 2
DARK SAND
DARK SAND
LIGHT SAND
LIGHT SAND
LEGEND – ZONE A – ▨ – DIRTY SAND TRANSPORTED TO BUILD MOUND.
ZONE B – ▨ – SECOND HUMUS LINE SHOWING A FEW FIRED AREAS
ZONE C – ▨ – YELLOW RIVER SAND BOTH CLEAN & STERILE
ZONE D – ▨ – THE OLD HUMUS SHELL FILLED ALSO CONTAINING MUCH SHERDS & SOME BONE & FLINT ARTIFACTS
ZONE E – ▨ – UNDISTURBED EARTH
▨ – HAND MADE CLAY FLOOR
▨ – FIRE BASIN
▨ – CLAY
▨ – GREY SAND
SCALE OF FEET
0 1 2 3 4 5 10

FIGURE 2.

245407—41 (Face p. 12)

loose sand in place and in preventing erosion by rainfall. As the mound settled, such a clay cap might be expected to settle a little more in the center than at the edges. Later occupants, seeking to bury their dead on the nearly flat top of the mound, could have laid them down on this clay cap and covered the bodies by carrying up an additional 18 inches of sandy loam. This seems to have been what happened. Plate 4, figure 2, shows the clay cap partially uncovered. After it was demonstrated that the clay cap was not an occupational level, the area was restaked and vertical slicing resumed. This clay cap is not shown in the profiles of the mound as there was no color differentiations between the clay and the loam above and below it. The difference was entirely in hardness. Since the clay was irregular and had no distinct boundary lines, it was difficult at its edges to trace it satisfactorily.

Feature No. 28.—This was a true clay floor which began first to show as a white clay line in the 55-foot profile. (See pl. 9, fig. 2.) The 55-foot cut was removed to expose this clay layer as shown in plate 9, figure 2, before it was decided to uncover this level horizontally. This was done, as shown in plate 9, figure 3, by excavation from the 60-foot profile to the 75-foot profile. The floor, made of a very light gray clay from 4 to 8 inches thick, was revealed as a true occupational level. This clay was quite different from the mound fill, both in color and texture, and easily separated from it. The area covered was an approximate rectangle about 27 feet N.–S., and about 23 feet E.–W. The central portion of this floor sagged heavily, probably due to differential settling of the mound, and there was a sharp tilt toward the northeast corner as shown in plate 9, figure 3. Probably when in use, the floor was much more nearly level. There was no evidence of any wall structure and no post molds were identified. In the central portion of this floored area, a long-continued fire had burned it to brick hardness and had discolored it over an area some 4 feet in diameter. A T-shaped depression in the clay was near this fireplace and was covered by a sand layer. (See pl. 13, fig. 2.) This depression was made of two intersecting troughs in the clay. One (the stem of the T) was about 5 feet long and the crossbar was about 3 feet long. These troughs had the appearance which might be produced by pressing a log 6 inches in diameter and of proper length into the clay floor. This clay trench and fire area had been covered by a thin layer of clean sand before the mound was erected over the floor. The position of this floor in the mound is well shown in figure 2 which presents profile drawings of the 55-, 60-, and 65-foot profiles.

BURIALS

Burial No. 1.—This burial of an adult was fully extended at a depth of 1.5 feet below the surface in square 70–0. It appeared to be inclusive. There was no evidence of a pit. This leads to the suggestion that this burial, along with others, was laid on the clay cap covering the original mound and covered over by new earth brought up on the mound. The skeleton was in very poor condition; nearly all the bones were crumbly. With it were 3 flint spalls, a flint knife, and two river pebbles.

Burial No. 2.—This burial was an adult in square 50L1 at a depth of 1.6 feet. The skeleton was in poor condition, the bones being beyond hope of restoration for study. This burial is shown in plate 8, figure 1. At the head were two vessels. One was a true pot with four strap handles shown restored in plate 12, figure 4, and the other was a water bottle shown in plate 12, figure 1. Under the left leg near the foot was a circular, engraved, and notched disk shown in plate 11, figure 1, and a small piece of galena was found nearby as shown in plate 8, figure 1. This skeleton, which lay directly on the clay cap of the mound, had been covered with a very dark clay which may have been puddled.

Burial No. 3.—This was a partially flexed burial at a depth of 1.5 feet below 60–0. This burial was badly disturbed and the skeleton much decayed. Many small bones were entirely missing. The skull was crushed and badly decayed. On top of it was a potsherd, and nearby were 7 triangular arrow points, shown in the lower left-hand corner of plate 10, figure 1.

Burial No. 4.—This was a fully flexed burial at a depth of 1.5 feet in square 75L2. The skeleton was in very poor condition, as shown in plate 8, figure 2. A small pot completely crushed was found nearby. This burial was inclusive in the mound, i e., it appeared that earth had been carried up with which to cover it over.

Burial No. 5.—This partially flexed burial lay at a depth of 7.3 feet below stake 40L2 and 2.2 feet below the level of the floor of structure No. 1. It was very well preserved. It was precedent to this floor since the floor extended unbrokenly above it, as shown in plate 3, figure 1. It lay in an elliptical pit 5 feet by 3 feet which was dug about 8 inches into the sand below the shell layer. It was not precedent to this layer since the shell layer was disturbed, and when the pit was filled, shells were included in the replaced earth. This burial, shown in plate 3, figure 2, was without artifacts in association.

Burial No. 6.—This was an extended burial of an adult at a depth of 1.5 feet in square 55R8. It lay directly on the clay of the mound and was in very poor condition; only fragments of skull and traces of the larger bones remained. At the feet were a piece of worked flint and a fragment of galena, and at the head was a small celt and fragments of a large pottery vessel which had been crushed.

Burial No. 7.—In the southeast corner of structure No. 1, a large pit had been dug through the structure floor. This pit was 5.5 feet long by 3 feet broad, generally elliptical in horizontal section, and about 3 feet deep. It extended through the floor and mound fill and through the shell midden below the mound. When the floor was cleared, this pit was found filled with black earth mingled with shell; all was much softer than the surrounding clay floor. When excavated, a lower jaw, a portion of the sternum, and several phlanges were found on the bottom of this pit. This was all that could be found of burial No. 7. It is not reasonable that such a deep, well-formed pit would be dug for the deposit of such fragmentary remains of a skeleton. It therefore appears reasonable to assume that this burial pit was dug through the house floor and used to bury a body. Later, perhaps at the time of desertion of this structure, the grave was opened and all of the skeleton removed save the scattered fragments found on the pit bottom. The grave was then filled loosely with the same earth that had been taken out of it. All this was done before the mound was erected over the structure floor.

Burial No. 8.—This burial was postulated only on evidence that in the southeast corner of structure No. 1 a subrectangular pit 5 feet by 3 feet was dug through the floor to a depth of 2 feet into the shell midden. When this pit was excavated in this investigation, no part of any skeleton was found, but a shell-tempered, large-mouth water bottle (pl. 12, fig. 3) was found at one end. This pit, partly excavated, is shown in plate 6, figure 1, with the water bottle in situ. It would also appear that here in this pit a burial had been made, but it had been later completely removed leaving the water bottle in the wall of the grave near the end.

Burial No. 9.—Immediately west of pit No. 8 was pit No. 9 which was dug through the clay floor of structure No. 1. In it was found the remnants of burial No. 9. The pit was about 5.5 feet N.–S. and about 2.5 feet E.–W. It had been dug to a depth of about 2 feet and then refilled. When the pit was excavated to a depth of 9 inches, as shown in plate 6, figure 1, the remnants of a skeleton were found. The lower legs were represented by two fibulae. The foot bones were in anatomical order. Of the remainder of the skeleton, two vertebrae, a few phalanges, two ribs, and one clavicle were all that were found. These were scattered in the grave with a few shells and some potsherds from the shell midden below. This burial had evidently been disturbed by aboriginal excavations, and the missing parts of the skeleton removed. There were no remaining artifacts.

Burial No. 10.—This burial had been made in pit No. 10 which was dug through the northwest corner of the floor of structure No. 1. The pit was almost square, being 3.5 feet on a side with rounded corners. It was about 1.5 feet deep, as shown in plate 6, figure 2. The pit contained no shell, but was lined with clean sand. Within it were found the bones of two feet in anatomical order; one tibia and fibula in proper relation. All the remainder of the skeleton was absent. There was found in association a bowl with two loop handles, shown in plate 12, figure 2, and at one end of the grave a pile of sherds representing a portion of a pot which had been crushed. Here again is definite proof of aboriginal disturbance of burials.

Burial No. 11.—At a depth of 8 feet in square 50L1 in a small area were found the bones of an arm and hand in anatomical order with other small bones, as shown in plate 7, figure 1. It was not possible to relate these bones to any other burial, as they were too far removed.

Burial No. 12.—This burial was a completely flexed skeleton in square 50R1. It was at a depth of 8.5 feet directly on the shell layer without any trace of a pit. It was obviously precedent to the floor of structure No. 1, being more than a foot below it. There was no intrusion through the floor at this point. This burial would properly be attributed to the shell midden of which it was a part. The feet and hands of this skeleton were missing, but all the rest of the skeleton was in anatomical order.

Burial No. 13.—This burial was a fully extended burial at a depth of 2 feet in square 70R2. The bones were so poorly preserved that they were merely seen as crumbly bone in the soil. At the head was a crushed water bottle and broken fragments of another small vessel.

Burial No. 14.—This burial was a fully extended burial at a depth of 2 feet in square 75R1. At the head was a large potsherd laid concave side up. The bones had nearly completely disappeared by decomposition. There were no other artifacts.

Burial No. 15.—This was a fully extended burial at a depth of 1 foot in square 85R1. The bones were completely disintegrated, and the position of the body could be traced only by the crumbling bone. There were no artifacts.

Burial No. 16.—This was an extended burial at a depth of 1 foot in square 90R1, shown in plate 13, figure 1. The skeleton was very poorly preserved. At the head were found the fragments of a large vessel and on the right side near the pelvis a group of 21 triangular white flint points. These are shown in the upper half of plate 10, figure 1. Also there was found a small sandstone celt shown on the left in plate 11, figure 2.

ARTIFACTS

Flint Projectile Points

Plate 10, figure 1, presents practically the entire collection of flint projectile points taken from this excavation. The upper portion of this figure shows 21 triangular points of white flint all taken from burial No. 16, which was at the very shallow depth of only 1 foot, on top of the mound. Another burial, No. 3, had in association the seven long triangular points shown in the lower left corner of this figure. It appears that all of these triangular points were very thin, well chipped, and mostly white in color; all were found in the very top of the mound above the clay cap upon which were made burials Nos. 1, 2, 3, 4, 6, 13, 14, 15, and 16. The other flint forms shown in plate 10, figure 1, were found in the general excavations in no special association but at all levels from 3 feet to the mound base. In plate 11, figure 1, there are presented two flint knives in the lower left-hand corner of the plate. The larger is 5¾ inches long by 1⅞ inches wide and was found at a depth of 1.5 feet in association with burial No. 1. The other knife was taken from the general digging at a depth of 4.5 inches, and the flint scraper shown in the lower right corner of the plate was found at a depth of 7 feet in the general digging.

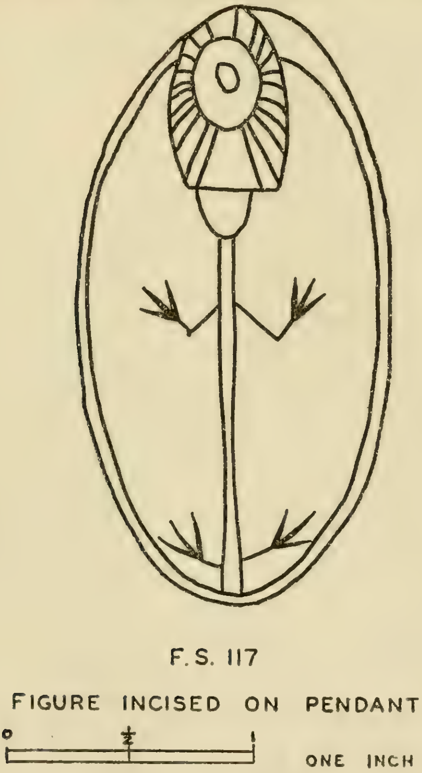


FIGURE 3.—Site Hn° 1.

This figure (pl. 11, fig. 1) shows in the upper left-hand corner a pendant made from a river pebble. It has been incised with a zoomorphic figure. This carving is reproduced in figure 3. Also in plate 11, figure 1, is presented the notched circular disk found under the left foot of burial No. 2. This sandstone disk is 5¼ inches in diameter and has seven notches equally spaced in the rim. It is flat on one side, but on the other there are two concentric incised circles. These have diameters of 3¾ inches and 4¼ inches respectively. This disk is very similar to notched disks reported by Moore (1905, p. 179) from Moundville.

Plate 11, figure 2, shows a number of stone discoidals or hammerstones. All of these came from the general digging at depths of from 4 feet to 8 feet in the mound. There was no burial association. They varied in diameter from 2¼ inches to 3½ inches. The sandstone celt 1¼ inches by 3¾ inches was taken from near the head of burial No. 6 at a depth of 1 foot. The two pottery disks shown in the same plate were at a depth of about 1 foot near the top of the mound. The small greenstone celt 1½ inches by 3½ inches was found in a midden area at a depth of about 4.5 feet.

The most interesting stone artifact from this site is the sandstone human effigy, shown in plate 5, figure 2. Beyond being clearly a human effigy, it is not possible to see in it any special form delineated. It has a maximum height of 16 inches and a maximum breadth of 9 inches. While the head is fairly well expressed, the trunk is not so clearly executed. Below the neck and shoulders the effigy is rough and unfinished. The back of the head is decorated by seven parallel deeply incised lines about ½ of an inch apart. The effigy has a smooth but rounded base, and it was evidently designed to set erect, perhaps on a clay floor. The eyes are made by incised ellipses but the other features were worked into low relief. The nose portion was slightly damaged, and the head was broken from the body just below the neck. One shoulder was broken off, and a portion was missing. It was found lying on its side, as shown in plate 5, figure 1, but breakage had been done before discovery, perhaps at the time of deposition. The nature of the fracture, when one considers the size of the object, would suggest "ceremonial breakage."

Morehead reported three stone effigies from his excavation at Etowah and vicinity. While these were similar to the image found at this site, those from Etowah were much more elaborately finished and much better executed in detail. Two of these stone images reported by Morehead (1932, figs. 3, 4, 69, *a*) had also been broken before being found.

BONE AND ANTLER ARTIFACTS

Plate 10, figure 2, presents a series of sharp-pointed cylindrical bone awls. These were from 3½ to 6 inches long, and all were found in a midden deposit of shell at depths from 6 to 9 feet below mound surface. They were in the old shell-midden layer which was precedent to the mound. The only other type of awl found at this site is that shown in the upper row at the right of plate 10, figure 2. These are made from the tarsometatarsal of a large bird, perhaps turkey. These two came from the midden layer under the mound at depths of from 6 to 8 feet below mound surface.

The horn drifts shown in the upper left-hand corner of plate 10, figure 2, are also found in the lower levels of the mound 6 to 8 feet deep in the midden under the mound. The bone "gouge," shown in the lower right-hand corner of plate 10, figure 2, is 1½ inches wide by 4½ inches long. It was found at a depth of 6.5 feet in square 55–0 in the general digging in the midden area.

POTTERY

There were nine nearly complete vessels recovered from this mound. All were shell tempered. Two pots and two water bottles were recovered unbroken, but four pots and one water bottle had been crushed in place.

Plate 12, figure 4, shows a true pot, with four strap handles, taken from burial No. 2. This pot has a maximum diameter of 6 inches, a height over all of 5½ inches, and a mouth diameter of 4 inches. With it in the same grave was the water bottle shown in plate 12, figure 1. It was 7 inches in maximum diameter, 9 inches in height, and had a mouth diameter of 2 inches. Plate 12, figure 3, shows a large-mouth water bottle taken from burial No. 8 in the pit below the floor of structure No. 1. This vessel is 7½ inches in maximum diameter, 7½ inches high, and had an interior mouth diameter of 3¼ inches.

Plate 12, figure 2, shows a bowl taken from burial No. 10 This bowl was 6 inches in height and 5½ inches in diameter at the rim.

Another badly broken pot, found with burial No. 4, was restored. It was shell tempered with flaring mouth and very similar to the pot shown in plate 12, figure 4. It had only two strap handles, was 6½ inches in height, and was 6½ inches in greatest diameter.

From the general digging three pottery pipes were recovered. The two shown on the right in plate 11, figure 1, were shell tempered and were of the elbow form. The elbow is not a right angle, but in each case the angle between the axis of the stem hole and center of the pipe bowl is about 120°. They are both (stem hole and bowl) much expanded at the end and might be well described as being "double conoidal." The largest pipe shown in the upper right-hand corner of plate 11, figure 1, is 2½ inches in the longest dimension. The pipe bowl is 1¼ inches outside diameter. The pipe, smallest of the three specimens shown in plate 11, figure 1, has seven clay loops about the edge of the bowl. These loops may be for the purpose of attachment of decorations. This pipe is clay-grit tempered and was found at a depth of 3 feet. The two shell-tempered pipes were found at a depth of about 8 feet.

Potsherds occurred throughout the mound but were most numerous in the midden area at the base of the mound. A total of 20,682 sherds were found in the general digging, exclusive of complete vessels. This midden area was at a depth of 7 feet below the mound surface at the 40-foot profile and at about the 8-foot level at the 60-foot profile. There seemed to be a secondary concentration of potsherds in a level about 3 feet above this old village level.

Table 1 presents the depth distribution of 20,682 sherds taken from the entire site. It also shows their distribution as to the type of decoration. It will be noted that the clay-grit temper is definitely predominant. These sherds are distributed as to temper as follows:

Fiber temper	24
Sand temper	36
Limestone temper	162
Clay-grit temper	19, 855
Shell temper	705
Total	20, 682

It will be observed that the clay-grit-tempered pottery is quite plentiful in the old village level—the 7- and 8-foot levels. In this old midden very few shell-tempered sherds occurred. In the 8-foot level not a single shell-tempered sherd was found. It would seem certain that this village midden, which was laid down before the building of the mound, was entirely due to a clay-grit-pottery people who had nothing to do with the mound construction. It would appear that a later people, the makers of shell-tempered pottery, came upon the site and constructed the mound without removing the old village midden. Upon this old midden, which contained very little, if any, shell-tempered potsherds as a base, they began the erection of the mound by bringing up earth from the vicinity. Much of this earth naturally came from the old village and contained a heavy admixture of clay-grit-tempered sherds as well as a very small amount of shell-tempered pottery which had been scattered on the surface of the village by the builders before they began the erection of the mound. Thus, a small amount of shell-tempered sherds are found incorporated in the mound fill, along with a much greater quantity of clay-grit-tempered ware. Types of this clay-grit ware are shown in plate 14.

TABLE 1.—*Distribution of potsherds taken from entire site (Hn° 1) as to temper, decoration, and depth*

Type of ware and foot level[1]	Decoration[2]									Total
	a	b	c	d	e	f	g	h	i	
Type 1:										
1 foot	------	------	------	------	------	------	------	------	------	------
2 feet	------	------	------	------	------	------	------	------	------	------
3 feet	1	------	------	------	------	------	------	------	------	1
4 feet	------	------	------	------	------	------	------	------	------	------
5 feet	------	------	------	------	------	------	------	------	------	------
6 feet	------	------	------	------	------	------	------	------	------	------
7 feet	------	------	------	------	------	------	------	------	------	------
8 feet	------	------	------	------	------	------	------	------	------	------
9 feet	------	------	------	------	------	------	------	------	------	------
10 feet	------	------	------	------	------	------	------	------	------	------
Debris	11	12	------	------	------	------	------	------	------	23
Total	12	12	------	------	------	------	------	------	------	24
Type 2:										
1 foot	------	------	1	------	------	------	------	------	1	2
2 feet	6	1	------	------	------	------	------	------	------	7
3 feet	1	------	------	------	------	------	------	------	------	1
4 feet	2	------	------	------	------	------	------	------	------	2
5 feet	1	------	------	------	------	------	------	------	------	1
6 feet	2	------	------	------	------	------	------	------	------	2
7 feet	1	------	------	------	------	------	------	------	------	1
8 feet	3	------	------	------	------	------	------	------	------	3
9 feet	------	------	------	------	------	------	------	------	------	------
10 feet	------	------	------	------	------	------	------	------	------	------
Debris	10	6	------	------	------	------	1	------	------	17
Total	26	7	1	------	------	------	1	------	1	36
Type 3:										
1 foot	------	4	------	------	------	------	------	------	------	4
2 feet	------	10	------	4	3	------	------	------	------	17
3 feet	5	3	------	1	------	------	------	------	------	9
4 feet	1	9	------	------	------	------	------	------	------	10
5 feet	------	7	1	------	------	------	------	------	------	8
6 feet	------	1	1	------	------	------	------	------	------	2
7 feet	9	1	------	------	------	------	------	------	------	10
8 feet	------	------	1	------	------	------	------	------	------	1
9 feet	------	------	------	------	------	------	------	------	------	------
10 feet	------	------	------	------	------	------	------	------	------	------
Debris	35	64	------	------	------	------	------	------	2	101
Total	50	99	3	5	3	------	------	------	2	162
Type 4:										
1 foot	147	16	------	63	------	------	------	------	------	226
2 feet	321	29	------	133	------	------	------	------	------	483
3 feet	528	73	------	398	------	------	------	3	------	1,002
4 feet	1,338	116	------	712	------	------	------	1	------	2,167
5 feet	1,940	97	2	786	------	------	3	1	------	2,829
6 feet	2,143	149	1	1,060	------	------	------	3	------	3,356
7 feet	3,338	282	2	1,605	------	------	------	------	------	5,227
8 feet	1,287	146	1	638	------	------	------	------	------	2,073
9 feet	127	8	------	71	------	------	------	------	------	206
10 feet	51	3	------	19	------	------	------	------	------	73
Debris	1,274	230	5	600	------	------	------	5	------	2,114
Total	12,494	1,149	11	6,085	------	------	3	13	------	19,755

[1] For names of pottery types and styles of decoration indicated by letters, see table 1, p. 525.

[2] Type 1, fiber-tempered ware; type 2, sand-tempered ware; type 3, crushed-limestone-tempered ware; type 4, clay-grit-tempered ware; type 5, shell-tempered ware.

TABLE 1.—*Distribution of potsherds taken from entire site (Hn° 1) as to temper, decoration, and depth*—Continued

Type of ware and foot level	Decoration									Total
	a	b	c	d	e	f	g	h	i	
Type 5:										
1 foot	51									51
2 feet	91	1								92
3 feet	98									98
4 feet	77									77
5 feet	72									72
6 feet	35									35
7 feet	15									15
8 feet	59									59
9 feet	6									6
10 feet										
Debris	192			6	1	1				200
Total	696	1		6	1	1				705

Foot level	Types					Total
	1	2	3	4	5	
1		2	4	226	51	283
2		7	17	483	92	599
3	1	1	9	1,002	98	1,111
4		2	10	2,167	77	2,256
5		1	8	2,829	72	2,910
6		2	2	3,356	35	3,395
7		1	10	5,227	15	5,253
8		3	1	2,072	59	2,135
9				206	6	212
10				73		37
Debris	23	17	101	2,114	200	2,455
Total	24	36	162	19,755	705	20,682

It appears that, by the time the mound had been raised 2 feet high (that is, had been brought to the 5-foot level), the builders were gathering most of their material from the the extensions of the old village about the mound. This would account for the considerable concentration of clay-grit sherds in the 4- to 6-foot levels. As the mound grew in height (the old village layer having been used up in building) there were carried upon the mound clean sand and clay in ever increasing proportions, as shown by a steady decrease in the total number of sherds incorporated in the mound. This is more significant when it is observed that this decrease in the number of sherds is most apparent in the clay-grit-tempered ware. The shell-tempered sherds (only a small percentage of the total) seem to have continued to be incorporated in the mound to its completion at a relatively uniform rate. Since only shell-tempered ware was included in the burial associations, it seems clear that the mound was built by this people, and that the great mass of grit-tempered sherds represents the contents of an earlier village midden. Evidence of this earliest village occupancy, as well as the village of the Shell Mound people, has been destroyed by cultivation and erosion outside the mound area. Test in the vicinity of the mound revealed no proof of the occupancy of either people.

CONCLUSIONS

A study of the material recovered from this site together with the structure of the mound seems to point to three phases of occupancy of this site and to suggest three different peoples as contributors to it. The earliest occupants built the first village and laid down the shell midden upon which the mound was later erected by others. Burials Nos. 5 and 12 seem to belong to this people. Their cultural status was that of the later dwellers on the shell mounds, who by that time had acquired the use of clay-grit-tempered pottery. Their occupancy may be characterized by the following list of traits.

SHELL MOUND COMPLEX

General traits:
- Shell mounds as habitation sites.
- Fire hearths on clay floors.
- Scattered post molds.
- River pebbles broken by heat.
- Fire basins floored with river pebbles.

Burial traits:
- Burial in shell mounds.
- Burials usually without artifacts.
- Partially flexed burials.
- Fully flexed burials.

Stone traits:
- Circular hammerstone.
- Long ovate flint blades unnotched.
- Wide-stemmed forms of projectile points.
- Flint drills.

Bone traits:
- Antler drifts.
- Bone gouge.
- Tibiotarsal awls of turkey.
- Cylindrical bone needles.

Pottery traits:
- Clay-grit-tempered sherd, predominant.
- Sand-tempered sherds, trace.
- Limestone-tempered sherds.
- Fiber-tempered sherds.
- Pottery never used as burial offerings.

This list of traits will be recognized at once as typical of the Shell Mound complex. The number of traits is relatively small, which may be accounted for on the basis that the midden was not deep and that it existed only where it was covered by the mound. It is probable that it was once much more extensive, but erosion and cultivation outside of the mound area had completely destroyed it.

The mound proper was built for the purpose of making a site for a structure. The people who built the mound and the structures are responsible for burials Nos. 7, 8, 9, 10, and 11. Who is responsible for the removal of these burials before the site was covered with earth, one cannot certainly know. It is considered probable, however, in view of all the findings, that the disturbance of these burials was done by their own people. This disturbance of burials reduced the number of ascertainable traits and made the cultural connections of this second people difficult to determine. They are characterized by the following list of traits:

BUILDERS OF THE SAND MOUND

General traits:
- Occupational levels on top of mounds.
- Prepared clay floors.
- Rectangular structures.
- Fire-burned areas on floor.
- Split-cane impression on clay floors.
- Scattered post molds.

Burial traits:
- Burials extended in flesh.
- Burials in pits below house floor.
- Artifacts with burial.
- Burials removed upon vacating house.

Stone traits:
- Sandstone human effigy.
- Ceremonial breaking of stone artifacts.
- Small greenstone celts.
- Circular hammerstone.

Pottery traits:
- Shell-temper pottery only.
- Bowl with two loop handles.
- Large-mouth water bottles.
- Pottery elbow pipes—120 degrees.

The cultural connections of this second people is not certainly apparent. However, if straws may indicate the direction of the wind, it may be noted that Jones (1873, p. 437) has reported a stone image from the vicinity of Natchez, and a broken stone effigy head very similar to the stone image found at this site was taken from mound C on the Fatherland Plantation near Natchez (Ford, 1936, p. 61). The Fatherland site is regarded as one of the historic Natchez sites. It is probable that this second complex at site Hn° 1 may later be shown to represent one of the Muskhogean groups found in historic times in Mississippi.

After this sand mound was completed and probably capped with a clay layer to prevent erosion, a third group of people came on this site. Their sole purpose seems to have been to bury their dead on the top. This method has been described herein. Burials Nos. 1, 2, 3, 4, 6, 13, 14, 15, and 16 belong to this last occupancy. The evidence for this third and last occupancy seems to be confined to these burials—made on the very top of this mound. From this occupancy the following trait list has been developed.

MOUNDVILLE COMPLEX

Burial traits:
- Burials on sites occupied by other people.
- Burials extended.
- Burials fully flexed.
- Burials with artifacts.

Stone traits:
- Triangular arrowpoints.
- Stone disks notched.
- Small celts, sandstone.
- Galena in graves.
- Large flint knives.
- Carved river pebbles.

Pottery traits:
- Shell-tempered pottery only.
- Pots with four strap handles.
- Long-neck water bottles.
- Pot with two strap handles.
- Pottery disks, 1-inch diameter.

It will be apparent at once that a considerable number of these traits previously have been found as associated with Moundville, Ala. These burials were made on top of the clay cap over the sand mound by placing the body on the clay and bringing up new earth with which to cover it. There was no evidence of the digging of a grave, although such evidence was sought. It is hardly to be supposed that all burials here were made at the same time, which would suggest an occupancy of the area for some period, even if brief. Because the mound had been saved from cultivation by the large trees growing on it, these superficial burials were preserved. If any village of these people ever did exist, all evidence of it had completely disappeared owing to cultivation, erosion, and occasional river floods which have been known to cover the field surrounding the mound.

FISHER MOUND, SITE Hn° 4

This site was an earth mound on the land formerly owned by H. S. Fisher in Hardin County, Tenn. The mound shown in plate 15, figure 1, was 350 feet north of the Alabama-Tennessee State line and 3,400 feet east of the Tennessee River as it returns northward into Tennessee.

The mound was conical, 70 feet in diameter and 11 feet in maximum height, and was situated on the crest of a ridge lying between the river and a slough, and within the contour of Pickwick Basin. To the east 800 yards, there is at the present time a good spring. The surrounding fields in 1936 were cultivated in cotton. In these fields slight evidence of village occupancy led to investigations by test pits, and three small pit areas were discovered, reported herein as Hn° 4–x1, Hn° 4–x2, and Hn° 4–x3. No detailed topographical survey of the site was made, but the site is located on Tennessee Valley Authority property map 8–585–67.

The mound was evidently constructed of a tough, heavy, yellow clay, similar to that of the vicinity. Superficial observation led to the conclusion, later verified by investigation, that this was a burial mound of the Copena complex. Since it was to be expected that subsurface pits would be encountered, the mound was staked in 5-foot squares over an area large enough to permit the first trench to reach subsoil without cutting into present mound structure. (See pl. 15, fig. 2.) Trenching was begun on the south side as shown in plate 15, figure 3. Plate 17, figure 1, shows the development of pits up to the 25-foot profile, and figure 2 shows the pits in the 35-foot profile, looking northward.

As in all Copena burial mounds, pits dug into the subsoil readily show a difference in the refilled earth, which makes their location easy. It has been found desirable upon the location of a pit to excavate around it and thus bring it into a pedestal, which later may be carefully cut down. Past experience has indicated that skeletal material is usually so far destroyed by decay, and artifacts are so few and fragile in this type of site, that only by this method can most evidence be secured. While there is no doubt that these mounds were erected as burial mounds, the outstanding features are the pits dug as graves. In many of these pits every vestige of skeletal remains has disappeared, and one can infer a burial only by circumstantial evidence. When pits contained no skeletal material, they have been listed under features as pits and where the presence of the skeleton was definite they have been listed as burials. Plate 16, figures 1 and 4, illustrate the appearance of the burial pits and the poor condition of the skeletal remains.

FEATURES

Below are listed 14 of the 26 features noted other than burials. These features describe 9 of the 83 pits found in this mound.

Feature No. 1.—This was a deposit of eight flint artifacts including a flint celt. (See pl. 16, fig. 3.) It was 3 feet below mound surface in square 10L5. It appeared to be a definite placement in a nearly circular pit about 2.5 feet in diameter. There was nothing else in association. Past experience would indicate that this was the remains of a burial.

Feature No. 4.—In square 15L4 two post molds, each 1 foot in diameter and 2 feet apart, extended to a depth of 4.4 feet to hardpan. Nothing was found in association to indicate a structure.

Feature No. 5.—A conical pit 1.1 feet deep by 1.7 feet wide was dug into basal hardpan in square 15L4.

Feature No. 9.—A cache of two fossil beads and a projectile point were found in a pit 3.8 feet below stake 25R1 in square 20–0.

Feature No. 14.—An oval-shaped pit 5.6 feet long by 2.2 feet wide was found in square 20L6. The pit began at a point 2.7 feet below stake 25L6 and extended to a depth of 2.3 feet. The bottom and side walls were lined with charcoal, and both base and walls were hardened by fire. The pit contained only clean soil.

Feature No. 15.—In square 30L5 a group of 14 stones had been intentionally placed to cover an area about 1 foot broad by 5 feet long at a depth of 2.7 feet below stake 30L5.

Feature No. 16.—A rectangular pit with rounded corners 7.2 feet by 3.9 feet was found 3 feet below stake 35R3. The depth of the pit was 1.1 feet. On the floor of this pit were found one galena ball and one copper ear spool. This would suggest that this had been a burial pit, but nothing else was found in the pit.

Feature No. 18.—In square 25L5, and extending into square 25L4, was an oval pit 5 feet long with maximum width of 2.9 feet. On the floor of the pit were ashes, charcoal, and burned logs. Among the logs, concentrated in two areas, were groups of galena pellets, which appeared to be the result of disintegration of larger pieces of galena. The logs were evidently burned in situ. This pit may represent a cremation—but there was no evidence of bone or artifacts in the pit. This feature is shown in plate 21, figure 1.

Feature No. 19.—At a level of 7.5 feet below stake 40R1 the top of an elliptical pit appeared. The pit, No. 34, was 8 feet E.–W. and had a maximum diameter N.–S. of 5.2 feet. The walls were vertical and the pit was 3.5 feet deep. On the bottom of the pit, which was irregular and rough like the pit walls, there was an area 6.5 by 2.7 feet covered with a blue gray clay. At this point the pit had been sunk 1.7 feet into the yellow-clay hardpan. The layer of blue clay had been puddled and smoothed out as it lay on the pit bottom. On this blue-clay layer there were some 15 galena pellets scattered about. Before taking the photograph of this pit shown in plate 25, figure 1, a section of the wall was removed to admit light and avoid excessive shadow. It is highly probable, in view of present information on this culture complex, that this pit represents a burial, yet there remained only circumstantial evidence of such use.

Feature No. 20.—This was pit No. 46, which lay almost entirely in square 30L6. The pit was elliptical, 6 by 4 feet and 2.3 feet deep. The pit extended into the subhumus zone and was completely filled with mixed earth, charcoal, and stones. It was clearly precedent to the mound, as the humus area covered the pit. At the humus level and on top of the 2.3 feet of fill in the pit, there was a large flat rock, on top of, and about which, were scattered galena pellets, and adjacent to which was an area of about 1 square foot covered with red ochre.

Feature No. 21.—At a level of 1.5 feet below stake 40L7, there was found a pit in square 35L7, which was 5.5 by 2.8 feet. The pit was rectangular with rounded corners, but the walls were rough. The bottom of the pit was completely covered by charred logs. There were numerous flat stones on top of these logs, and some on the pit bottom under the logs. A few stones were set edgewise against the walls of the pit. These did not in any way constitute a stone cist or show any special attempt at arrangement. Under the charcoal directly on the hardpan lay a large round pale greenstone celt.

Feature No. 23.—This was a cache of 16 galena pellets in a basin-shaped pit at a depth of 3.8 feet in square 50R1.

Feature No. 24.—This pit was the largest and most elaborately constructed in the mound. It covered nearly all of square 45–0 and the western half of 45R1. The pit was very nearly rectangular, with rounded corners and lay east and west as shown in plate 23, figure 2. At the top it was 9 feet long E.–W. by 5 feet N.–S. The walls sloped inward so that at the bottom at a depth of 4.1 feet, it was 7.5 feet long by 4 feet broad.

When this pit was dug, the earth removed from it was thrown out to form a ridge about the top of the pit. This earth covered an area of about 17 feet E.–W. by 16 feet N.–S., which was not spread out in a level layer, but was drawn up to a more or less pointed ridge which roughly encircled the pit mouth. This pit may have been used for burial, though there is no positive evidence of such use. On the bottom of the pit near one end were three projectile points (shown in pl. 29, fig. 2) and at the other end five copper beads.

This pit was exceptional, not only in its very large size, if it was to be used as a burial pit, but also because of the evidence presented that it was once covered with logs. At both the east and west ends of the pit, on the pit rim and extending out a foot or more on to the bank were definite impressions of the ends of logs 3 to 5 inches in diameter. These logs evidently were laid closely side by side to cover the pit mouth. The eastern edge of the pit shows 14 impressions and the western edge 13 end impressions.

It is manifest that the pit was covered with logs and that the mound was erected over it without the pit having been filled with earth. Later when the logs decayed, and after they had been pressed down into the loose clay about the pit mouth to make their impressions, they fell in, allowing the mixed earth of the mound to fill the pit.

This pit, which probably constituted the main burial tomb in this mound, is shown in various aspects in plate 24. Attention is directed to plate 25, figure 2, which is a longitudinal section of this pit, dug into the subsoil. This figure shows the original thin humus layer on each side of the pit and also how the earth from the pit was raised in a ridge about the pit mouth. Figure 4 is a drawing of this pit, showing dimensions.

Feature 26.—In square 50L3 at a depth of 9.1 feet a rectangular pit was found 6.6 feet in maximum length and 3.4 feet in maximum breadth, with its long axis NW.–SE. It was a subhumus pit 2 feet deep. On the bottom there was some gray puddled clay and about the periphery at the top were scattered charcoal fragments. At the southeast end a vertical post mold was centrally located, with a depth of 1.2 feet, as shown in plate 21, figure 3.

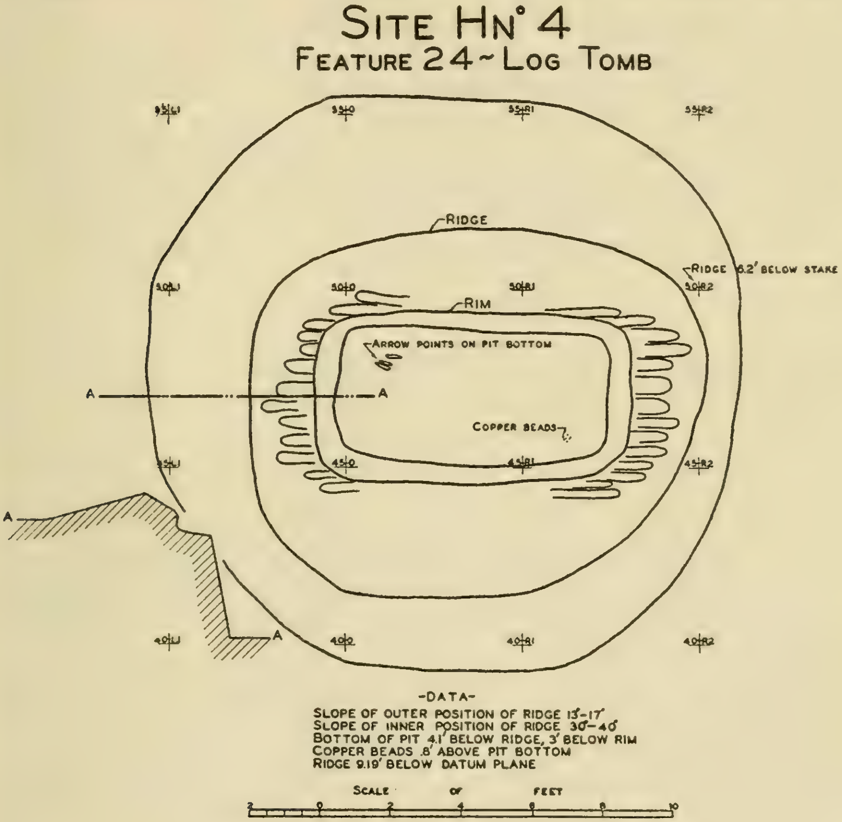

SITE HN° 4
FEATURE 24 ~ LOG TOMB
55 L1
55 0
55 R1
55 R2
RIDGE
RIDGE 6.2' BELOW STAKE
50 L1
50 0
50 R1
50 R2
RIM
ARROW POINTS ON PIT BOTTOM
A
A
COPPER BEADS
45 L1
45 0
45 R1
45 R2
A
A
40 L1
40 0
40 R1
40 R2
-DATA-
SLOPE OF OUTER POSITION OF RIDGE 15°-17°
SLOPE OF INNER POSITION OF RIDGE 30°-40°
BOTTOM OF PIT 4.1' BELOW RIDGE, 3' BELOW RIM
COPPER BEADS .8' ABOVE PIT BOTTOM
RIDGE 9.19' BELOW DATUM PLANE
SCALE OF FEET
2
0
2
4
6
8
10

FIGURE 4.

BURIALS

There were 64 burials listed in the excavation of this mound. It should be noted that it is particularly difficult to determine in many cases what is and what is not a burial. This is always true of the burials in mounds of the Copena Focus of northern Alabama. The skeletal material has so far decayed that the remains may be limited to a few fragmentary bones—a few teeth caps, and sometimes to only crumbly bone. Burials were inferred in the absence of skeletal remains when artifacts were found in pits of a size and shape suitable for burial. However, of the 64 burials listed at Hn°4 in the mound proper, only 26 had any mortuary offerings intentionally deposited in the grave. Of these 26 burials, 5 had only small galena pellets, leaving only 21 burials with artifacts. At this site there was a considerable use of puddled clay in the grave pits. A total of 17 graves showed puddled clay used in varying degrees.

All burials were placed in pits, the size and shape of which were taken as an indication of the manner of disposal of the body. Cremations were easy to identify since the action of fire preserved the bone fragments. Some burials were clearly deposits of disarticulated bones. The following tabulation shows the distribution of artifacts among the different types of burials and indicates how the use of puddled clay is found in various types:

Summary of burial forms

Without artifacts:	*Total*	*Puddled clay*	With artifacts:	*Total*	*Puddled clay*
Extended	20	6	Extended	11	5
Flexed	8	--	Flexed	6	1
Cremations	3	--	Cremations	4	2
Bone burials	7	1	Bone burials	5	2
Total	38	7	Total	26	10

Total burials 64, of which 17 showed the use of puddled clay.

For further description, the burials containing artifacts are listed in order, together with six extended burials in which the chief feature is the use of puddled clay.

Burial No. 4.—This was an oval pit 6 by 3.5 feet, sunk 2.2 feet deep into the hardpan below the mound base in square 20L4. The pit had an oval concave base and straight sides. On the bottom of the pit were 3 flint projectile points, 3 flat rough stones, a ball of galena, and a string of 21 copper beads. There were no bones or any evidence of skeletal parts. An extended burial is assumed. At one end of the pit, just outside its edge and symetrically placed, was a single post mold, indicating that a post of about 6 inches in diameter had been set in the hardpan.

Burial No. 5.—This burial was in an oval pit some 3 by 20 inches. It was in square 25L4 at a depth of 1.3 feet below the surface. At one end of the pit were the crowns of eight teeth, and at the other end a leaf-shaped flint projectile point. (See pl. 29, fig. 1, extreme right lower row.)

Burial No. 9.—This was a circular pit about 2.3 feet in diameter, 4.5 feet below stake 30R1. On the bottom of the pit was a portion of the skullcap and the crowns of teeth. All other bones had disappeared. With these fragments of the skeleton was a string of copper beads made of rolled sheet copper. The string was still preserved well enough to hold the beads together.

Burial No. 10.—This was an oval pit 5 by 2.5 feet dug 3 feet below stake 30L3 in that square. On the bottom of this pit a layer of clay 3 by 1.8 feet had been spread out, and hardened by fire. The edge of the clay layer was rough and irregular. There was no evidence of cremation, but there was some charcoal mixed with the earth over this clay layer. On the clay layer were found part of the skull of a small carnivore, a portion of a conch shell badly decayed, and two flint projectile points. (See pl. 29, fig. 1, third and fourth from right in lower row.)

Burial No. 11.—In square 30L1 at a depth of 5.6 feet below stake 35L1 was a small pit about 1.8 feet in diameter. The walls of the pit were definitely burned and hardened by fire. A few teeth of a very young person were found in this pit with a single copper bead and a large conch shell poorly preserved. The bead and teeth were on top of the conch shell. (See pl. 16, fig. 2.)

Burial No. 21.—This burial was in a pit 4.6 by 1.7 feet and 3 feet deep. It was in square 35L2, and the pit bottom was 5.4 feet below stake 40L1. The bottom of the pit had been lined with cane, which was pressed down into the puddled clay base, leaving well-preserved impressions. At one end of the pit, as shown in plate 19, figure 1, was a ball of galena, and a string of about 100 copper beads. Just below the beads were scattered crowns of teeth.

Burial No. 24.—This burial in square 35L5 was in an oval pit 4.6 by 1.8 feet and 0.8 foot deep. It is shown in plate 23, figure 1, which presents the 55-foot profile. The bottom of the pit was 3 feet below stake 40L4. There were present, besides teeth, fragments of skull, humeri, and tibiae, so arranged as to suggest a partially flexed burial. On the bottom of and at one side was a pile of galena pellets. The shallow depth of this pit (No. 42) may be attributed to the intrusion of pit No. 44, which came down partly over pit 42. There was no disturbance of the burial in pit No. 42, however. A charred log, found over the end of pit No. 42 and above burial No. 24, was thus deemed to belong to pit No. 44.

Burial No. 25.—In a small oval pit, 2 by 1.6 feet in square 35L5 and 2 feet below stake 40L5, there were found fragments of skullcap, teeth, and galena pellets, which seemed to indicate a burial of bones, or at least a skull. Since there was no evidence of cremation, it would seem that the pit was too small to admit an adult body in the flesh, in any form.

Burial No. 27.—This was a typical, puddled-clay burial as shown in plate 20, figure 2. It was in square 40.0 at a depth of 2.1 feet below stake 45R1. The pit was 7.3 by 1.7 feet—nearly rectangular at bottom. The clay was 0.4 foot thick and rested on a thin layer of sand intentionally placed. Although there were no bones and no artifacts in this pit, in the light of other information it was deemed to have been an extended burial.

Burials Nos. 28 and 29.—In a pit 5.6 by 1.9 feet and at a depth of 3 feet below stake 45L2 in square 40L2, these two burials had been made. (See pl. 20, fig. 1.) The bodies were probably extended side by side, since at one end two nearly complete sets of teeth in anatomical order were found. These two sets of teeth showed lower and upper teeth in juxtaposition, but all trace of bone had disappeared. Between the bodies, i. e., on a median line in the pit, was a ball of galena. The bottom of the pit had been covered with puddled clay and after the placement of the bodies, a puddled-clay layer 0.4 of a foot thick had been placed over them, completely sealing them to the lower layer. While all bone had disappeared, the two sets of teeth were thus held in anatomical order.

Burials Nos. 30, 31, and 32.—This triple burial was in a circular pit 8.4 by 8.3 feet in square 30L3. The pit had been dug through the humus zone to the hardpan. Directly on the hardpan a puddled-clay layer was placed and the three bodies were seemingly extended parallel to each other and each covered with puddled clay and sealed in, as shown in plate 22, figure 1. The tops of the individual graves were not quite on the same level, and their upper surfaces were slightly corrugated as if small poles had been laid over them, but no evidence of wood was found in the pit. There were no artifacts and no bones remained in these burials. Their acceptance as burials rests wholly on evidence from similar clay structures in pits which were found to contain remnants of extended burials. (See pl. 20, fig. 3.)

Burial No. 33.—This burial was in square 40L5, at a depth of 2.9 feet in a pit 2.1 by 1.3 feet. The bottom of this pit was a puddled-clay basin upon which lay a few skull fragments and two teeth, with a string of about 50 rolled sheet-copper beads. The puddled-clay basin was 0.4 foot thick, but the burial was not covered with clay.

Burial No. 36.—This burial lay on a puddled-clay area in a pit 6.2 feet by 2.2 feet in square 40R2 at a depth of 7.5 feet. (See pl. 21, fig. 2.) The clay layer was 0.2 foot thick except in the region of the skull where it was 0.8 foot thick. Only the skull remained, and it was in very poor condition. At the side of the pit was a large greenstone celt and near the center a pile of galena pellets.

Burial No. 42.—This burial was in an oval pit 3.9 feet by 1.7 feet in square 45L0 at a depth of 5.0 feet. On the bottom of this pit were found fragments of slabs of wood poorly preserved. A few bone fragments were found, one recognized as a fragment of a femur. There were many pellets of galena scattered about, some resting on the decayed wood and a number piled up at one end of the pit. There was no puddled clay nor any evidence of cremation.

Burial No. 44.—In a small pit 2 feet by 1.3 feet in square 45R2, at a depth of 5 feet, was found a small area of puddled clay. On this rested one fragment of a long bone and five small galena balls. This seems to represent the remains of a burial of bones.

Burial No. 45.—This burial was in a pit 4 feet by 2.6 feet in square 45L6 at a depth of 1.8 feet. On one side of this pit three large rocks had been set on edge, seemingly without any definite purpose. Within the pit were found most of a skull, a scapula, a left tibia, and remnants of vertebrae. This had evidently been a flexed or partially flexed burial. Under the head of the skeleton was a greenstone celt. At the opposite end of the pit were two balls of galena.

Burial No. 46.—This was the burial of an infant in an oval pit 3 feet by 1.6 feet at a depth of 2.1 feet below stake 45L5. The skull and larger bones were well enough preserved to show the body had been fully extended in the small pit. Beginning at the neck and scattered to the feet were galena pellets to the number of several hundred. At the feet were four projectile points of flint, one a triangular point, and the other three the leaf-shaped blades characteristic of the Copena Focus. These are shown as Nos. 1, 2, and 5 from the left in the lower row of plate 29, figure 1. Under the chin was a string of shell beads, and over the lower portion of the body a block of mica about 6 inches by 4 inches and ¼ of an inch thick. At the foot of the skeleton was a lump of coal tar. The entire burial had been covered by a thin layer of red ochre.

Burials Nos. 47, 48, and 49.—In square 50L2 a rectangular pit 3 feet by 2.2 feet was dug down to hardpan. In one end of this pit, on a puddled-clay area about 1 foot in diameter, had been piled the cremated remains of burial No. 47. These consisted of burned-bone fragments and teeth. On the side of this pit and some 18 inches removed from burial No. 47 was a skull with several vertebrae attached. This was burial No. 48. This skull, fairly well preserved, had not been burned, and seemingly had been buried separately from the body. With it were many small galena balls. At the other end of the pit, burial No. 49 was represented by a pile of skull fragments, badly decayed, but showing no effect of fire.

Burial No. 50.—This was a puddled-clay burial (see pl. 19, fig. 2) in a pit 8 feet by 2.4 feet in square 45L2 at a depth of 2.5 feet. On the removal of the top clay layer, fragments of skull with lower jaw and two vertebrae were found. A few fragmentary long bones indicated that this was an extended burial. There were no artifacts.

Burial No. 51.—In a circular pit 1.4 feet in diameter and 4.8 feet below stake 55.0 were found skull fragments—teeth and galena pellets. This appears to have been the burial of a disarticulated head.

Burial No. 55.—This burial was in a pit 5.1 feet by 2.4 feet in square 45L4 and at a depth of 9.31 below stake 50L3. The body appears to have been extended and galena pellets were scattered over it. It was then covered with puddled clay and a fire built centrally upon it. On top of the clay cover the clay was hard burned and covered with charcoal. The heat from this fire burned the bones below it and caused the galena to disintegrate and show action of fire. The skull seems not to have been affected by this fire. On top of the clay cover there were sections of wood slabs reduced to charcoal. At the foot of the grave, there were two large rocks—Tuscaloosa conglomerate—common to that region. This burial is shown in plate 18, figure 1.

Burial No. 56.—In a pit 6.5 feet by 2.2 feet in square 55L1 and at a depth of 1.7 feet, a large, greenstone hoe or spade was found lying on the bottom of the pit. There were no bones or other artifacts. The burial is inferred from the shape and size of the pit, and because of the stone digging tool.

Burial No. 60.—This burial is shown in plate 22, figure 2. It appears to have been a cremation in situ. A pit 5.5 feet in diameter was 1.7 feet deep, the bottom of the pit being 6.2 feet below stake 50L5. The pit covered nearly all of the square 45L6. The pit contained many large rocks, which, when removed, showed a hard-burned floor covered with ashes and charcoal. A few sections of charred logs remained. On the bottom of the pit galena balls and teeth were found which showed the result of fire. This pit is shown in plate 22, figure 3, with the large rocks removed.

Burial No. 61.—This puddled-clay burial is shown in plate 19, figure 3; the pit was 8.2 by 2.5 feet and its bottom was at a depth of 8.3 feet below stake 55L1 in square 50L2. Only the skull, in very fragmentary condition, was found when the top clay layer was removed. The puddled-clay area was 7.5 by 1.7 feet, symmetrically located in the pit. The following extract quoted exactly from the notes of W. G. Haag, the field-party supervisor, gives a good description of this type of burial of which there were many similar in this mound.

> This puddled clay burial is typical. In a subhumus pit, the puddled clay rests directly on the hardpan. The rough uneven surface of the puddled clay is probably due to differential settling of the ground.
>
> The clay itself is a heavy fat gray clay with a great deal of sand mixed into the clay. The sand is a pure white sand and is not completely or thoroughly mixed into the clay, but rather gives the appearance of having been spread over the clay after the latter had been placed on the burial.
>
> The outer margin of the puddled clay is thickest and settling in the middle gives a basinlike shape. The evidence observed indicates that a body was not merely covered with clay, but was completely encased in it.

Burial No. 63.—This burial and pit are shown in plate 18, figure 2. The pit in square 55L1 was subrectangular, 4 by 2.4 feet, and was 5.4

feet below stake 60.0. Much of the skull, in fragments, and fragments of leg bones remained. There were enough of each to show that the body had been partially flexed in the pit. Galena pellets were found near the chin.

VILLAGE AT SITE HN° 4

About earth mounds of the Copena Focus it has been difficult heretofore to find evidence of village sites which seem to have any positive connection with the builders of the mounds. In the vicinity of site Hn° 4, test pits were put down in an attempt to discover evidence of occupations. Three areas were found which clearly show traces of occupancy connecting them with the mound. They were designated as Hn° 4–x1, –x2–x3. Each is described briefly.

PIT AREA HN° 4–X1

This area, 30 by 40 feet, was immediately adjacent to the mound, in the cotton field, as shown in plate 26, figure 1. This area showed no evidence of occupancy on the surface, having long been in cultivation. When, however, the topsoil was removed and the hardpan exposed, subsoil pits were revealed to the number of 11, together with scattered post molds. Plate 26, figure 1, shows how the excavation of subsoil about the pits has brought them into relief. This method of excavation permits very careful removal of the earth in the pit.

Pit No. 1 was 6.1 by 2.6 feet and 1.2 feet deep, below the surface of the hardpan. It was in square 10R1 and was elliptical in form with vertical walls. It contained three small greenstone celts (see lower row, pl. 30, fig. 1), but no other artifacts. It may have been used as a grave, though there is no evidence of that fact.

Pit No. 2 (see pl. 26, fig. 2) was 7.3 by 3.2 feet and was 3.7 feet deep. It was oval in form with vertical walls and flat bottom, and contained only a little charcoal. It is not impossible that this may have been a storage pit, but its shape suggests a burial pit.

Pit No. 6 was rectangular, 3.1 by 2.2 feet, with an interior depth of 2.4 feet below hardpan. The pit was filled with black soil quite in contrast to the red clay hardpan. In this pit were three balls of galena placed from 1.6 feet to 0.8 foot above the pit bottom.

All the other pits were devoid of artifacts. They were generally 2 or 3 feet deep in subsoil and may represent storage bins. It is possible, however, that they represent graves from which all skeletal material has disappeared. The scattered post molds suggest some form of simple structure associated with the pits.

PIT AREA HN° 4–X2

About 500 feet north of the mound on the tip of a secondary ridge in the cotton field another area, some 40 by 70 feet, was investigated.

Superficially, this area showed no evidence of occupancy, but after the soil was removed, again subsoil pits were revealed to the number of seven.

Pit No. 1 was found in square 40R2, and was detected when only 0.8 foot of soil had been removed as shown in plate 27, figure 1. The pit, oval in form with nearly vertical walls, was 9 by 3.5 feet in dimensions. The bottom, 2.1 feet below the surface of this pit, was lined with a foreign clay, gray in color. Between two layers of this clay a ball of galena and a copper reel were found. On top of the puddled clay there were a copper bar and a ball of galena. Near the copper bar was a bone fragment. These last are shown on the bottom of the partially excavated pit in plate 27, figure 2. Near this pit were two post molds which seem to be at the same level, and may be associated with it.

Pit No. 2, in square 40R4, was circular in form, about 3.5 feet in diameter, and was found to contain portions of a skull and long bones. There appears to have been a reburial of bones in this pit which was very shallow, the bones being just below the plow line. There were no artifacts with the burial.

Pit No. 3, which lay in square 30–0, was 6.5 feet deep. It contained no bones or artifacts, but there was considerable charcoal near the top of the pit.

Pit No. 4, a circular pit, 3.5 feet in diameter and 4.6 feet deep in square 20R6, was lined at the bottom with puddled clay and contained much charcoal over the clay. The clay was fire-hardened.

Pit No. 5, in square 50–0, was a rectangular pit 6.5 feet by 3.1 feet and 4.1 feet deep. The bottom was lined with strips of puddled clay 2.6 feet wide by 6.3 feet long. On this clay near one end was a ball of galena and at the other end a few chunks of charcoal. Near one end of the pit—just outside of the excavation, and symmetrically placed, was a single post mold indicating a post of about 4 inches in diameter.

Pit No. 6 was in square 50R10 and was 4.4 feet deep. It contained no bones or artifacts. It was nearly rectangular, 7.2 by 2.4 feet with slightly sloping walls.

Pit No. 7 was an oval pit 7.5 by 3.2 feet in square 60–0. It was 3.4 feet deep and contained nothing except a portion of charred log. These pits and their contents definitely establish relationship with the builder on Hn° 4. However, this area adds nothing new to the complex of traits, except to suggest that burials may sometimes have been made in the subsoil of a village rather than in a mound. However, this area may have been an incipient mound, or at least an area which in due course might have been chosen for the site of a mound had occupancy continued.

PIT AREA HN° 4-X3

This area, about 40 by 70 feet, was 70 feet from the mound. The soil was removed to a depth of about 0.8 foot in order that the subsoil might be searched for pits. This site is shown in plate 28, figure 1. Only one pit, some 6 by 4 feet and 2.4 feet deep, was found cut into the subsoil. The pit was void of artifacts and bone, but contained many small rocks. At one end a large post mold was found just outside the pit excavation.

The most interesting feature of this area was what appeared to be the remnants of a structure. These were two strips of puddled clay, about 30 feet long—roughly parallel and about 5 feet apart. These appear to be the remnants of walls which are just below the plow line. The plow had probably destroyed all other portions. These are shown in plate 28, figure 2, and in plate 28, figure 3, is a close-up of a section of this wall. The section has a vertical thickness of 0.4 foot and an approximate width of 0.3 foot. The area here had long been in cultivation, and this remnant gives little clue to the original structure. Several post molds appear in the vicinity of the wall remnants, but add nothing to the possible interpretation of this very long and narrow configuration.

ARTIFACTS

The artifacts from this site were not numerous and in general were those to be expected from a mound of the Copena complex. Chief interest was attached to the flint projectile points from this mound. Of the 26 flint points and fragments taken from this mound, 15 were found in association with burials. Many were quite similar in form, as shown in lower row of plate 29, figure 1, and are taken to be typical of this complex of traits. Other flint points and fragments of different types were found in the general digging in the mound and probably represent chance inclusions. The Copena type of point is well illustrated in plate 29, figure 2, showing three points taken from a cache in feature No. 24. In this type of point the base is square or slightly convex. The blade, from the base, at first contracts and then expands, thus having edges concave from the base to two-thirds of its length, after which the edges become convex, and the blade comes to a sharp point. Since the Copena Focus has been assigned to a Hopewellian phase it was of interest to determine if the occurrence of this type of point had been noted in Ohio Hopewell. Accordingly, some ten or more of these points were submitted to Dr. R. G. Morgan, Curator of Archeology at Ohio State Museum. He noted two forms—one represented by first specimen in right lower row (pl. 29, fig. 1), and the other form illustrated by the other specimens of the row. Of these he says:

Neither of these types has been noted for Ohio Hopewell. As far as I know they do not occur in the Hopewellian phase as it is known in the Middle West. The quality of workmanship shown by the specimens is very good and approaches that of the better Hopewell pieces. It is worthy of note that the specimen numbered 85 [center specimen lower row, pl. 29, fig. 1] has had both edges smoothed near the basal portion (the smoothing may be noted for a distance of about 1 inch from the base). A similar smoothing of the edges near the base has been recorded for the Folsom-like points from Ohio. (See Shetrone, The Folsom Phenomena as Seen from Ohio, Ohio State Archaeol. and Hist. Quart., vol. 45, No. 3, 1936.) This smoothing has also been recorded for the true Folsom points of the Southwest.

The dimensions of the types of specimens shown in plate 29, figure 2, are from left to right: Length 3.8 inches, breadth 1 inch; length 4.2 inches, breadth 0.9 inch; length 3.9 inches, breadth 0.8 inch.

The greenstone celts, as shown in plate 30, figure 2, are characteristic of this complex and are respectively 10, 11.5, and 12 inches in length. It is unusual to find greenstone celts as small as those shown in plate 30, figure 1.

Plate 31, figure 1, shows typical copper artifacts of the Copena Focus, taken from this mound. The copper reel is 5.75 by 6.25 inches with maximum diagonal 8.25 inches. It is made of copper plate about 0.1 inch thick. The copper bar shown at the left is very thin, and may have been a copper crescent or the residue of a reel. The earspool is of the usual form and the copper beads are of both nugget form and rolled thin sheets.

Summary of artifacts from mound and associated areas

Copper reel	1	Potsherds	6
Copper earspools	1	Projectile points, Copena type	15
Copper bar	1	Projectile points, singular and broken	11
Copper bead strings (total of 221 beads)	11	Greenstone celts	8
Flint celt	1	Galena balls	44
Flint scraper	1	Sheet mica	2
Flint drill	1	Shell beads	2
Coal tar lump	2	Conch-shell fragments	2
Red ochre, occurrence	1	Greenstone spade	1

POTTERY

Only six potsherds, shown in plate 31, figure 2, were found at this site. All were inclusive in the mound and were found in the general digging. One sherd, the sand-tempered sherd, type 2F, was found in the matrix of subsurface pit No. 33, at a depth of 4 feet below the surface of the mound. It has a well defined "pineapple" effect (pinched ridge) surface (type 2F). Five of the sherds are "hole" tempered. This is the result of the leaching of limestone tempering material as all the holes are angular and one of the sherds still retains some of the tempering material of crushed limestone. Of the five sherds of this type, three have legs attached. One is plain, undecorated sherd (type 3A). The other four bear rectangular stamp (type 3C).

The smallness of the number of sherds, and their condition in the mound would seem to indicate that the sherds were chance inclusions, gathered up from some village site when the mound was built, and they were not, thus, necessarily a product of the people who built this mound.

USE OF GALENA

Often specimens of galena found in Copena sites appear to be merely "chunks" of this heavy crystal sometimes deposited in burial pits and sometimes found "floating" in the mound.

The large number of galena specimens found at this site (44 in all) were mostly found in burial pits. The majority of these appear to have been worked into approximate spherical form. Plate 32 shows 6 of these specimens. The smallest weight was 1 pound and the largest weighed 93.5 ounces.

BOYD'S LANDING, SITE HNº 49

This site is a small earth mound about 250 feet east of the Tennessee River in Hardin County, Tenn., and about one quarter of a mile north of Boyd's Landing. The mound was built on the river bottom and was covered with trees and undergrowth. Being within Pickwick Basin, it had been cleared by the Basin Clearance Division of TVA and when staked for this excavation appeared as shown in plate 33, figure 1. A depression appeared in the center of this mound which suggested an earlier investigation. A careful check of topography seems to identify this site as one tested by Moore (1915, p. 230) of which he says:

> MOUND NEAR BOYD'S LANDING, HARDIN COUNTY, TENN.
>
> In sight from the river bank when foliage does not intervene, about one quarter mile in a northerly direction from Boyd's Landing, in woods forming part of the property of Mr. J. H. Lakey, living about one mile farther back from the river, is a mound 7 feet in height. The mound has been washed away to some extent or dug into considerably, years ago. At all events, part of its northern side is missing, so that what probably was once a circular base with a diameter of 70 feet, has that dimension now only through its E. and W. parts. There was almost no summit plateau, and the mound, judging from its shape, might well have been erected for burial purposes.
>
> From the summit of the mound a hole 11 by 6.5 feet was carried to a depth of 7 feet 9 inches, reaching a dark band marking the original surface, 7 feet 7 inches down. From the base of this excavation five holes were dug, one in the center and

> one in each corner, the corner ones extending 18 inches down through clay evidently without former disturbance, with one exception where 5 inches below the line of the base two masses of galena (lead sulphide), one somewhat larger than a clenched hand, one coated with lead carbonate, the white-lead of commerce, used for the making of paint. . . . these masses lay on undisturbed clay, but were surrounded by the dark material composing the base-line, and evidently were a deposit of some kind.
>
> The central hole put down from the base, 4 feet long by 20 inches wide, was carried through material that seemed to have been disturbed, perhaps by the planting of a post. Nothing was discovered in this hole.
>
> In the main excavation in the mound, which went through raw clay without indication of occupancy or of burial, were no fireplaces. The only artifacts found were occasional chips of flint and fragmentary projectile points, perhaps introduced with the clay in the making of the mound. Five masses of galena, two together, also were come upon in the digging.

In view of this statement it was felt the mound was still worthy of a complete investigation. This was undertaken in the hope that Moore's trench had not reached all subsoil pits and that the mound might be shown definitely to belong to the Copena complex. However, the results of a careful excavation were somewhat disappointing. The pit put down by Moore had removed the central position, and water admitted by seepage had further hastened destruction of any other remains. Plate 33, figures 2 and 3, which present the 25- and 35-foot profiles, show the mound to have been erected in the usual manner of mounds of this complex. However, there seemed no pits of any kind discernible outside the excavation made by Moore.

From the meager evidence available we must conclude that this was a Copena site. The absence of other pits may be accounted for on the basis that this was a small mound and had burials only in the center, which were reached by Moore's trench. It may also be that this is a very old mound of this type, so old that every vestige of skeletal material has disappeared.

However, the excavations here yielded from the general digging 36 field specimens as follows:

Galena balls	10
Flint artifacts	21
Potsherds	4
Copper celt	1
Total	36

The 10 flint specimens shown in plate 34 represent the best of the 21 specimens found scattered in the mound. They are believed to have been accidental inclusions, having been gathered up with the earth when the mound was erected. They seem definitely not to be a part of the Copena complex.

The galena balls shown in this figure are typical of the Copena complex. The copper celt shown second from the left in the upper row of plate 34 is only 1¼ inches by 2 inches, made very thin of beaten copper, but sharpened at the blade. The rim sherd shown in plate 34 is hole tempered and may be the Copena limestone-tempered ware, much weathered.

SMITHSONIA LANDING, SITE Lu° 5

This site is an extensive shell mound on the immediate bank of the river about 10 miles west of Florence, Ala. This shell midden, some 12 feet deep and covering an area 125 feet broad by 250 feet long, was at one time the actual site of the steamboat landing at Smithsonia, Ala. Prior to and immediately after the Civil War, when steamboat traffic on the Tennessee River was of considerable importance, this old landing was a center of much commercial and agricultural activity. A number of large buildings and a warehouse were built on it; this last remained until very recently, when it was destroyed by fire. This long, concentrated activity of historic occupancy at this site had considerably modified the original surface of the site. Roadways to the old landing, as well as the traffic at the landing, had worn down the shell and forced it into the river. Erosion at the river face had always been active. The midden, shown in its present form in plate 35, figure 1, probably had a very different appearance in prehistoric times. It is just opposite to site Ct° 27 near the mouth of Mulberry Creek. The shells of which it was composed probably came from the same shoals adjacent to it that furnished the material for the Colbert County site.

BURIALS

Time did not permit an extensive excavation here, but it was considered important to test the site to determine, if possible, whether or not its history had been similar to Ct° 27 on the opposite bank of the river. Accordingly, the mound was staked and a trench shown in plate 36, figure 1, was cut through the mound from north to south at right angles to the river bank. It was hoped that time would be sufficient to make a satisfactory sampling of the site. Plate 35, figure 2, shows the natural zones which appeared in the first profile 10.5 feet deep. In this trench six burials were found classified as follows:

Sitting burials	3
Partially flexed	1
Disturbed	2
Total	6

Burial No. 1.—This burial shown in plate 37, figure 1, was at a depth of 1.5 feet. It was a partially flexed burial with flint projectile points in association. The skull had been removed or destroyed, perhaps by disturbance, since it was so near the surface. The skull appearing in plate 37, figure 1, is that of burial No. 2 immediately below burial No. 1.

Burial No. 2.—This burial shown in plate 36, figure 2, is a typical sitting-posture burial and was evidently intruded from a depth not greater than 1 foot from the surface. This would seem to indicate that this type of burial came very late in the history of the occupancy of this site.

ARTIFACTS

The general digging at this site yielded field specimens as follows:

Bone awls	8
Splinter awls	8
Bone needles	12
Worked bone	5
Antler drifts	3
Antler tips	8
Cut antler	11
Atlatl weight	1
Tubular pipe	1
Greenstone celt	1
Schist gorgets	2
Pestle	1
Mortar	1
Grooved ax	1
Flint scrapers	3
Columella beads (18), occurrence	1
Pearl beads (3), occurrence	1
Total	68

Besides these there were 288 flint points and 141 potsherds.

Plate 37, figure 2, presents some of the bone and stone artifacts from the site.

The two fragments of slate gorgets are similar in type to those found in the shell mounds. The tubular pipe is 4 inches long and very similar to pipes of this form found at site Lu° 25 on Seven Mile Island.

Types of flint occurrence here are shown in plate 38. A careful study of these 288 flint points did not reveal any significant distribution of any type, or of the flint as a whole.

POTTERY

The 141 potsherds from this site were classified as to depth and type of temper as follows:

TABLE 2.—*Pottery from site Lu° 5 classified by depth and type of temper*

Depth (feet)	Temper					
	Fiber	Clay-grit	Lime-stone	Sand	Shell	Steatite sherds
1	19		75	2		1
2	4		25	4		
3		1	3			
4			3			

It will be observed that limestone temper is the dominant type and that there were no shell-tempered sherds found on this site. On shell mounds the occurrence of shell-tempered pottery has always been associated with extended burials near the surface of the mound. There were no extended burials found in this excavation, which may be significant in view of the absence of shell-tempered sherds.

It is a matter of great regret that the inundation of the Basin occurred before this excavation was hardly more than started. The small amount of excavation and relatively small amount of cultural material recovered makes detailed conclusions impossible.

SEVEN MILE ISLAND, SITE LU° 21

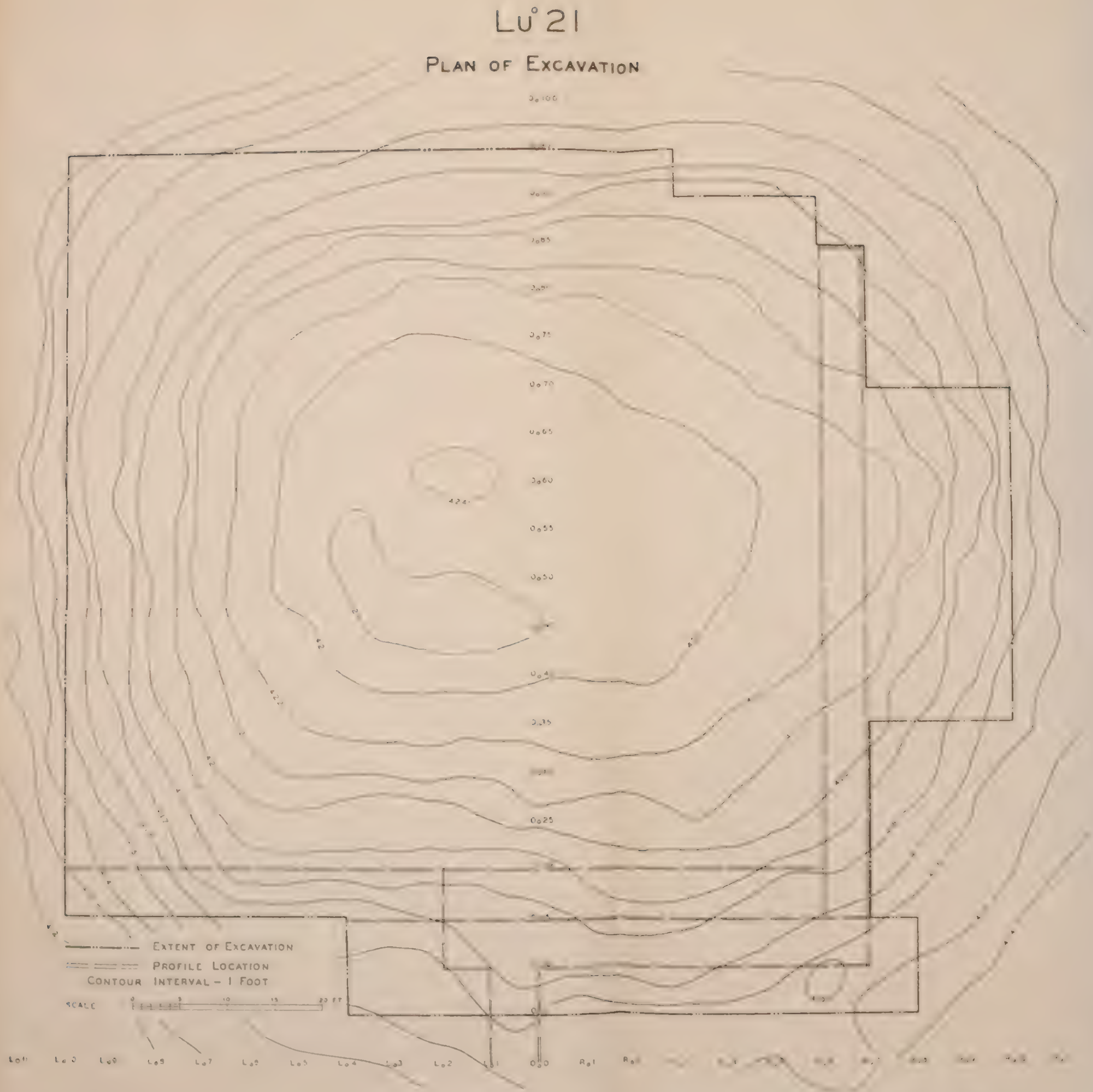
This site was an earth mound on the immediate bank of Seven Mile Island near the center of its northern edge. As its name implies, the island is 7 miles long and it is about ½ mile wide at its widest point. It lies in a general E.-W. direction immediately west of the city of Tuscumbia, Ala. The upper (east end) of the island is slightly north of the central portion, as at this point the Tennessee River turns slightly southward for several miles before resuming its westward flow. The upper end of the island is just opposite the wharf at Sheffield. The island, formerly owned by Frank Perry, of Florence, constituted a body of very fine farm land, and many tenant farmers had large areas in cultivation. The shore of the island and the banks of several sloughs which cut across it had grown up in dense timber, so that at the time of the transfer of the island to the Tennessee Valley Authority, there were considerable logging operations on the island. These operations made possible a road over the towhead, and heavy trucks could thus ford the sloughs reaching the northern shore of the island directly, in time of low water. This road, none too safe at best, was generally quite uncertain since the river level not only varied with rainfall, but was determined on any particular day by the number of gates open at Wilson Dam, some 5 miles upstream. Circumstances prevented the excavation of this site in the summer of 1937 during the brief seasonal period of low water, and it was not until late fall that work could be started. By that time the water in the sloughs to the north of the island had become too swift to permit the handling of a rowboat with safety, and access from the southern shore was impractical. Although the site was worked by a Colbert County crew, it was found that the only practical way for working parties to reach the island near the site was to cross from the northern (Lauderdale County) side. This was accomplished by stretching a steel cable from the mainland on the north shore to the towhead opposite the site and a second cable from the towhead to the island. These cables were anchored to tree stumps and, by use of them, boats were pulled in comparative safety across the very swift stream.

Plate 40, figure 1, shows the cable across the slough from the towhead to the island, and the mound on the immediate bank just above the landing, where steps were cut in the earth bank. Plate 40, figure 2, shows the mound just after staking. Since the mound base was very near the contour to be reached by the water of Pickwick Reservoir, it was not permissible to cut the large oak trees growing at a somewhat higher level. These large trees, not actually on the mound, overhung a portion of it and cast shadows over the excavations. These shadows made photography of the special features very difficult. How near the base of the mound is to the flood level of Pickwick Lake is illustrated in plate 57, figure 2. In March 1938, when the lake rose as a result of flood condition, the river pushed backwater into the excavations and, though it did not quite cover the lower floor of the mound, as shown in plate 57, figure 1, it did prevent the excavation of the very considerable village which lay under the mound. It is a matter of regret that this investigation was interrupted before completion since it is known that the lower village represents a different cultural complex from the mound proper, and careful planning of the work would have enabled the crew of workmen shown in plate 58, figure 1, to have completed the investigation before inundation if it had been possible to follow the original schedule of operations.

It was apparent from a simple inspection of the site as shown in plate 40, figure 2, and plate 41, figure 1, that the mound was a truncated pyramid with a nearly square base. It was comparatively flat on top. The site was reported by C. B. Moore, who stated that at the time of his investigation it was entirely covered by a barn, which prevented his examination of it by excavation.

Figure 5 shows a contour map of the site upon which has been superposed the staking system. This figure also shows the boundaries of the excavation which extended 90 feet W.-E. and 100 feet N.-S. The zero line was laid down W.-E. across the center of the mound and thus all excavations lay between L10 on the north and R10 on the south. Excavations were begun on the west side of the mound along the 0–5 cut, which was chosen because of the easy disposal of earth. Plate 41, figure 1, shows the 20-foot profile revealing mound

4/2
Lo11
Lo



Lu°21
PLAN OF EXCAVATION
0,100
0,85
0,75
0,70
0,65
0,60
0,55
0,50
0,35
0,25
EXTENT OF EXCAVATION
PROFILE LOCATION
CONTOUR INTERVAL – 1 FOOT
SCALE
0
5
10
15
20 FT
L0 11
L0 10
L0 9
L0 8
L0 7
L0 6
L0 5
L0 4
L0 3
L0 2
L0 1
0 0
R0 1
R0 2

FIGURE 5.

structure. By the time the 35-foot profile was reached, shown in plate 41, figure 2, there could be no doubt that the mound had been built as a succession of occupational levels, each a truncated pyramid with flat top. In plate 42, figure 1, horizontal cutting back to the 45-foot profile revealed the relation of these different floors. Each is separated from the other by very great contrast in the color and texture of the earth used, as shown in the R4 profile presented in plate 42, figure 2. This profile reveals two truncated pyramids one resting on the other, the lower one resting on a black-sand mound about 3 feet deep, evidently made by scraping up the surface of an old village. In this sand was found the usual detritus of a dense occupational level. In the sand were post-mold patterns, as presented in plate 42, figure 2, which extended into the clay below the village level.

MOUND STRUCTURE

It appears that the first occupants of the site dwelt in a village on a layer of river-deposited sand on top of a hard clay subsoil. They seemed to have built a broad low mound of this sand from the village, which contained grit-tempered potsherds, shell, charcoal, and the usual residue of a village.

"FLOOR B"

Later, on this low mound of black sand 3 feet deep, a clay-truncated pyramid was constructed approximately 70 feet square at the bottom and 3 feet thick. This truncated pyramid was very exactly built of mixed red and blue clay, and was made flat on top. The sides of this pyramid, very uniformly worked, sloped at an angle of 30° to the horizontal. The area of its top was about 60 feet square. The surface of this pyramid is designated as "floor B," and contains many special features, as shown in plate 47, figure 2, which will be discussed later. The constitution of this pyramid is remarkable not only in the exactness of its construction, but the manner in which the very red and very blue clays were blended to form a mottled colored zone. The extreme color contrasts which are shown in plate 42, figure 1, enabled one to easily separate each individual load as it was originally laid upon the site. Both of these clays were easily accessible on the island, and it appears that throughout the construction of this great pyramid, each colored clay was used in about equal amounts, the loads being laid down alternately. There were no great concentrations of either color alone in any part of this structure. The mottled effect of the mixed clay is well shown in the 35-foot profile in plate 42, figure 1.

"FLOOR A"

After the occupation of "floor B" was discontinued, the whole pyramid was covered over with a layer of dark-red, sandy clay very uniformly 1.5 feet thick, except on the north side where it was nearly 2.5 feet thick. This pyramid was also nearly flat on top. The red clay layer extended down over the sloping sides of "floor B," as shown in plate 42, figure 1, and plate 44, figure 1. The top of this pyramid shown in plate 44, figure 2; plate 45; and plate 46, figure 1, had also been used as an occupational level, as shown by scattered post molds and burials, and is designated as "floor A." The surfaces of both floors "A" and "B" were very easily separated from the earth above them, not only because of difference in color, as shown in plate 46, figure 2, but because of difference in texture. These floors were very hard and compact, and suggested that the clay was worked when wet, i. e., puddled, and perhaps polished by long use in the open.

Finally, this pyramid was covered over to a depth of about 4 feet with a dark sandy loam, which contained some midden material, quite in contrast to the pure clay structure below it. Whether or not any occupancy ever occurred on the top of this last increment to the mound may never be known. The mound had been cultivated both on its top and sides, and when excavated, was being used as a kitchen garden. This plowing and consequent erosion had destroyed all evidence in this black sand of any occupational level, if any had ever existed on the mound surface. However, on the south slope of this sand layer, about 1 foot above "floor A," there was a layer about 3 inches thick containing small scraps of wattle. This layer covered an area 20 feet long on the southern slope and appeared to represent the destruction of a building on "floor A," which, having been built of wattle, was destroyed, and the residue pushed down the slope and covered over by the black sand layer. The lower edge of this layer of broken wattle is well shown in vertical profile presented in plate 43, figure 1. Scattered fragments of wattle—some showing the action of fire—were found in other portions of the black-sand layer. These may have come from a structure on "floor A," or possibly one from the surrounding village.

FEATURES

Feature No. 1.—This consisted of "floor A" and of the scattered post molds found on it. Figure 6 is a drawing of this floor showing the placement of the post molds and the location of burials Nos. 7 and 9. The post molds here showed no regular arrangement, and the nature of the structures on this floor are left in doubt. The floor on which these molds are scattered is 50 by 56 feet.

Feature No. 2.—This is a post-mold pattern of a very interesting structure on "floor B." This is shown in plate 49, figure 1, and a longitudinal section of the post-mold pattern is shown in plate 49, figure 2. In the construction of this building, the small posts of the wall were not set in trenches, as was often done, but they appear to have been driven in from above. This, and their possible settling, due to the weight of the structure, compressed the earth layers under them, as may be observed in plate 50, figure 2, which shows a close-up of a longitudinal section of several individual molds. Figure 7, which shows a ground plan of "floor B," presents feature No. 2 in relation to feature No. 3 to the northward. In this floor plan of the post-mold pattern, it will be observed that in each corner of the structure, inside of the line of small post molds, is a large pit. This pit is elliptical in form at the floor surface; the major axis of the ellipse, 3 feet long, lies along the diagonal of the structure. The pit tapers toward the bottom, nonsymmetrically, to terminate in a circular post mold of 1-foot diameter at a depth of 3 feet. Plate 51, figure 1, shows a vertical section of such a corner post mold. Plate 51, figure 2, shows a view from above of one of these molds, carefully excavated. All four molds were very similar in size and form. The figure shows how a post 1 foot in diameter could have been inserted in this pit and made to stand erect against a solid vertical wall by having the pit filled on the inside only, and the clay well tamped in position. From the position of these four large post molds it seems certain that these four corner posts, braced from the inside, carried much, if not all, of the weight of the superstructure. It is believed that the smaller vertical posts, which evidently leaned inward toward the structure, were attached to horizontal logs overhead, supported by the four corner posts. This structure pattern, approximately 20 by 23 feet, presents very definite evidence of the manner of its construction. Plate 50, figure 1, shows how the larger corner posts were set inside the line of small posts. On the floor, just inside the line of small posts, there was a small banquette of puddled clay, as shown in plate 49, figure 1, and also in plate 47, figure 2. This banquette, before it was cut away by excavation, extended entirely around the structure wall, except at the doorway on the north side. On the outside of the line of small posts, there was a channel pressed into the sloping clay floor, which extended beyond the walls of the structure. This channel seemed to form a gutter and probably assisted in the drainage. This gutter, well shown on the right of the structure in plate 49, figure 1, also extended on all sides of the building, except at the doorway shown at the extreme right of this photograph. This photograph was taken looking from the east. The doorway is thus in the eastern end of the north wall and faces the river. This doorway was marked by two posts about 4 inches in diameter, set nearly in the gutter, with an elevated section of clay between them. The manner of setting these smaller posts was the same as that used for the corner posts. Holes were dug—large at top, small at bottom—one wall of the hole being kept vertical. The post was thus set vertically, but nonsymmetrically, and held in place by earth tamped behind it.

Slightly to the east of the center of this floor, a fire basin had been constructed by digging a cylindrical hole somewhat larger than 1.8 feet in diameter and 1 foot deep. This hole was carefully plastered with puddled clay which was worked into a smooth rim to unite with the clay floor about its edge. When burned, this clay-lined fire pit was brick hard. When uncovered, it was found filled with ashes containing much burned bone.

Based on the facts which are presented by this floor and post-mold pattern, the artist has prepared a drawing reconstruction of this building. Plate 69, figure 1, shows the building from the outside, and plate 69, figure 2, shows the inside construction. This reconstruction is an attempt to show how a building might have been built using the following observed specification:

1, Four large corner post molds.
2, Outside lines of small post molds.
3, Outside clay gutter.
4, Inside banquette of clay.
5, Door in east end of north side.
6, Nonsymmetrically placed fire basin.

The fire basin may have been off center because of the diagonal logs overhead. This type of bracing would have been very effective engineering for posts set in holes dug nonsymmetrically as was the case here. The artist in this restoration used cane thatching, since there was no evidence of earth covering and no evidence of wattle walls at this floor level.

While in all such reconstructions it must be admitted that there must be of necessity a high degree of uncertainty as to some details, yet it is believed that it is worth while to attempt to demonstrate how a structure could have been erected at this site to meet all conditions known to exist. The artist seems to have accomplished this objective.

Feature No. 3.—This feature was an approximate rectangular post-mold pattern 26 by 30 feet on "floor B," immediately north of feature No. 2, but at a level about 1.5 feet below the floor of feature No. 2. These molds varied from 8 inches to 12 inches in diameter and were placed from 2.5 to 3.5 feet apart. They were not placed in trenches, but each post seemed to have been set independently. They were set, irregular in line, to form the walls. On the eastern side, there seems to have been portions of two walls. Figure 6 shows a drawing of this pattern to scale. There can be no doubt that here was a structure, but its form of construction cannot be well made out. Near the center of this post-mold pattern, the clay floor was burned over an area

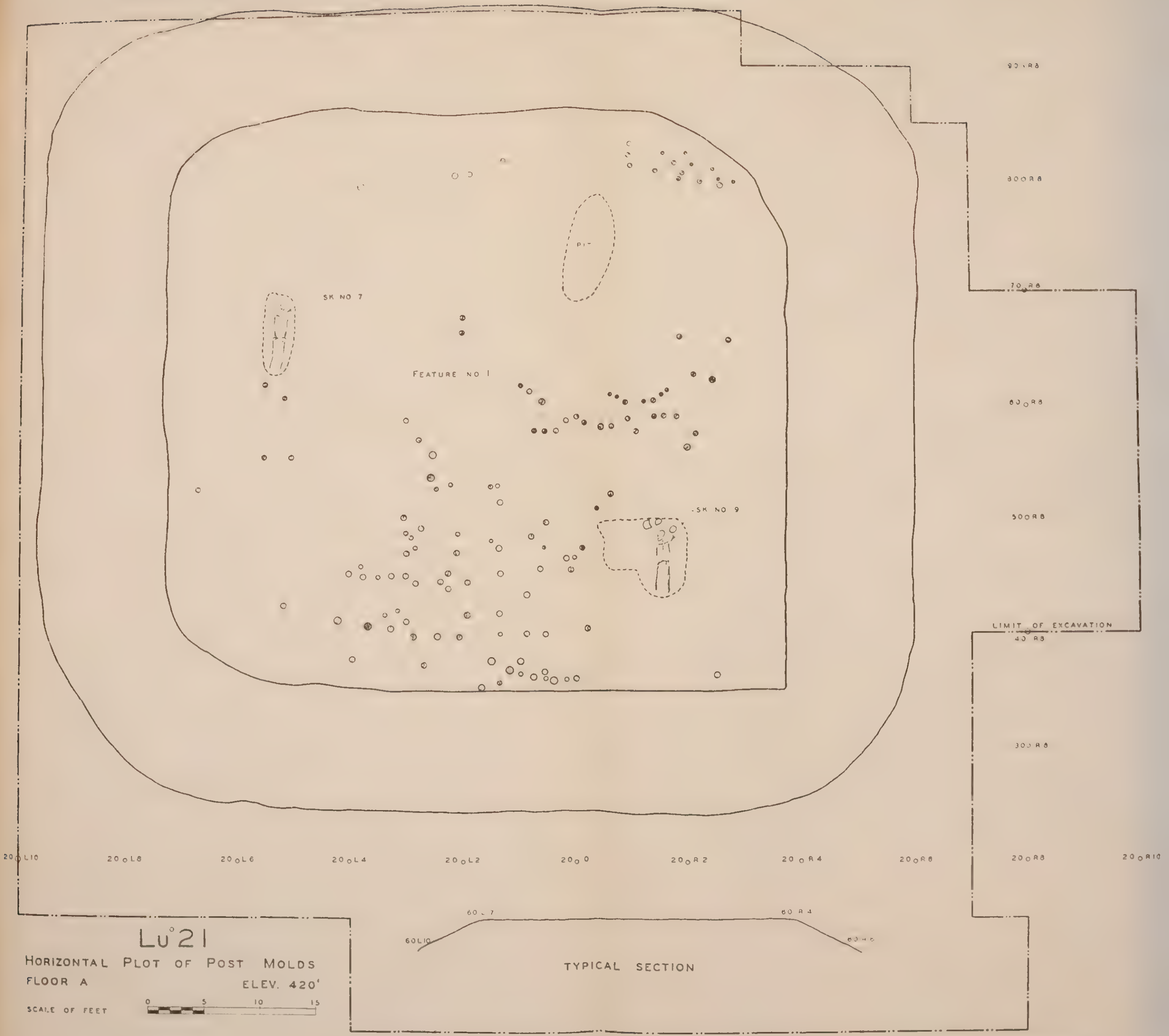

90 R8
80 R8
70 R8
60 R8
50 R8
LIMIT OF EXCAVATION
40 R8
30 R8
PIT
SK NO 7
FEATURE NO 1
SK NO 9
20 L10
20 L8
20 L6
20 L4
20 L2
20 0
20 R2
20 R4
20 R6
20 R8
20 R10
60 L7
60 R4
60 L10
60 R6
TYPICAL SECTION
Lu°21
HORIZONTAL PLOT OF POST MOLDS
FLOOR A
ELEV. 420'
SCALE OF FEET
0
5
10
15

FIGURE 6.

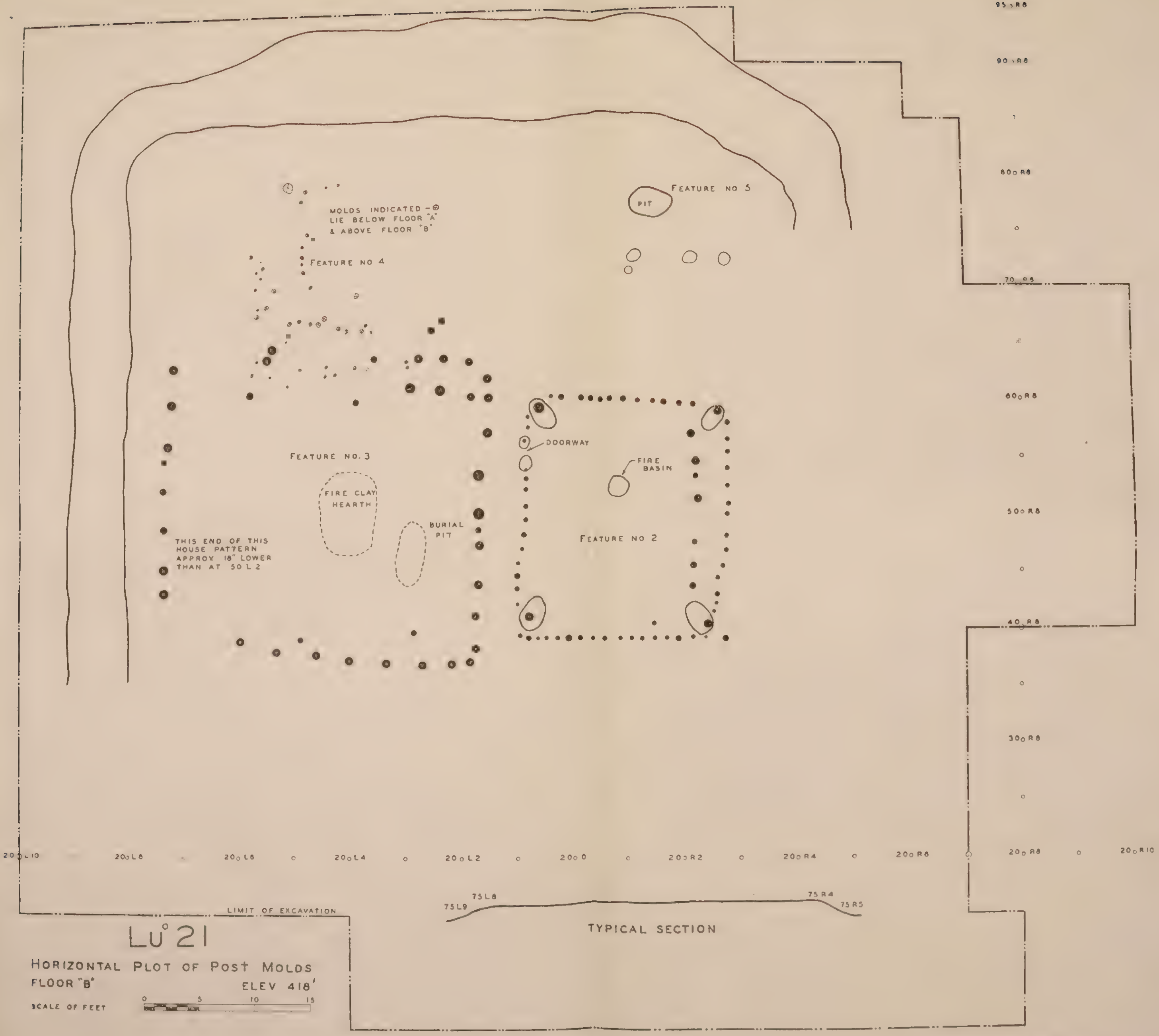

95 R8
90 R8
80 R8
70 R8
60 R8
50 R8
40 R8
30 R8
20 L10
20 L8
20 L6
20 L4
20 L2
20 0
20 R2
20 R4
20 R6
20 R8
20 R10
FEATURE NO 5
PIT
MOLDS INDICATED -⊕ LIE BELOW FLOOR "A" & ABOVE FLOOR "B"
FEATURE NO 4
FEATURE NO. 3
FIRE CLAY HEARTH
BURIAL PIT
THIS END OF THIS HOUSE PATTERN APPROX 18" LOWER THAN AT 50 L 2
DOORWAY
FIRE BASIN
FEATURE NO 2
LIMIT OF EXCAVATION
75 L8
75 L9
75 R4
75 R5
TYPICAL SECTION
Lu°21
HORIZONTAL PLOT OF POST MOLDS
FLOOR "B"
ELEV 418'
SCALE OF FEET
0
5
10
15

FIGURE 7.

5 by 7 feet. Near this fire hearth, a burial pit 3 by 5.5 feet had been cut through the floor.

Feature No. 4.—This was a group of small post molds scattered at random over an area east of feature No. 3. These molds were not visible on "floor A," but they were slightly above "floor B" on the northeastern corner of the first truncated pyramid.

Feature No. 5.—This was a circular pit about 4 feet in diameter near the southeast corner of "floor B." It was excavated in the R2 cut and found to contain three broken pottery vessels, as shown in plate 48, figure 1.

Feature No. 6.—This was a scattered group of small post molds on the southwest corner of the excavation in the hardpan under the black-sand layer. This group, in association with other features in the hardpan, is shown in figure 8.

Feature No. 7.—This is an incomplete rectangular pattern of post molds in the hardpan below the midden layer. This pattern is shown in plate 43, figure 1, and also in the ground plan of the excavation of the mound base in figure 7. Within this rectangular pattern there was a semicircular line of some 15 post molds, suggesting the remains of a small circular structure. The pattern was too incomplete to determine its size. On the floor of the feature, burials Nos. 4, 5, and 6 were made, near the center of the post-mold pattern, and just outside this pattern at a slightly higher elevation was a single grave containing skeletons Nos. 2 and 3. Burial No. 10 was found in the sand under this feature.

Feature No. 8.—This was a rectangular post-mold pattern 16 by 17 feet in the black sand directly under the first clay pyramid. This pattern was first seen in the R2 profile, shown in plate 54, figure 1. Its position under the clay forming the first pyramid is shown in plate 54, figure 2, and plate 55, figure 1. Plate 55, figure 2, shows how the mottled red and blue clay was laid down on this floor pattern, the individual post molds remaining empty in some cases, which is unusual. Plate 56, figure 1, shows the whole pattern uncovered. There were scattered molds inside of the pattern and in the center of the floor there was a hard-burned area in the sand. There was a doorway in the north side near the northeastern end. There was no evidence of a trench in which the posts were set. Features 9, 10, and 11 represent portions of rectangular post-mold patterns which overlap at about the same levels. It was not possible to tell which was precedent to the other. The extent of these patterns and their relation to each other is shown in plate 56, figure 2, and plate 58, figure 1. Feature 9 seems to have been about 1 foot higher than features Nos. 10 and 11. Near the center of features Nos. 10 and 11 burned areas showed use of fire on the central area.

BURIALS

Sixteen burials were discovered in the excavation of this mound. They may be grouped as follows:

Fully extended adults	9
Fully extended infants	3
Partially flexed	3
Indeterminate	1
Total	16

Eleven of these burials had with them 19 pottery vessels and 5 large pottery sherds. There were found 10 other complete pottery vessels from the general digging. All complete or nearly complete vessels were shell tempered.

Burial No. 1.—This was a burial of an infant, fully extended, 30 inches below the surface in the black-sand layer capping the mound. It was in square 40L2 and was very poorly preserved. At the head was a small shell-tempered pot.

Burials Nos. 2 and 3.—This was a burial of two extended bodies in an open pit, the skeleton of No. 2 on top of No. 3. The pit had been dug in the black sand under the mound. The bottom of the pit came down to almost the level of the post-mold pattern, feature No. 7. It lay just outside of this feature on the east side of square 65R9. This grave is shown in plate 43, figure 2. It is notable in the quantity of pottery included in the pit. Eight more or less complete vessels were removed and many large sherds. A large water bottle—an owl effigy, badly broken—is seen in the foreground of plate 43, figure 2, together with a "twin" vessel seen inverted in the grave. The head of the owl effigy is seen restored in plate 63, figure 2.

Burials Nos. 4 and 5.—This was a double burial of two infants, each partially flexed, with feet together and heads at opposite ends of the grave. Preservation was very poor. The pit was in the black sand in square 55R8 on the floor of feature No. 7. At the head of burial No. 4 was a double or "twin" pottery bowl.

Burial No. 6.—This was an extended burial in the black sand on the floor of feature No. 7 in square 55R8. An open-mouthed pottery vessel was near the left side.

Burial No. 7.—This was an extended burial in square 65L5 on "floor A." Near the head, on the right side, was an open-mouthed vessel.

Burial No. 9.—Resting on "floor B," but intruded from "floor A," was a pit in square 45R2. In this pit were the remains of an extended burial nearly destroyed by decay. At the head was a small pottery vessel and a sherd of a very large utility vessel. This burial is shown in plate 48, figure 2.

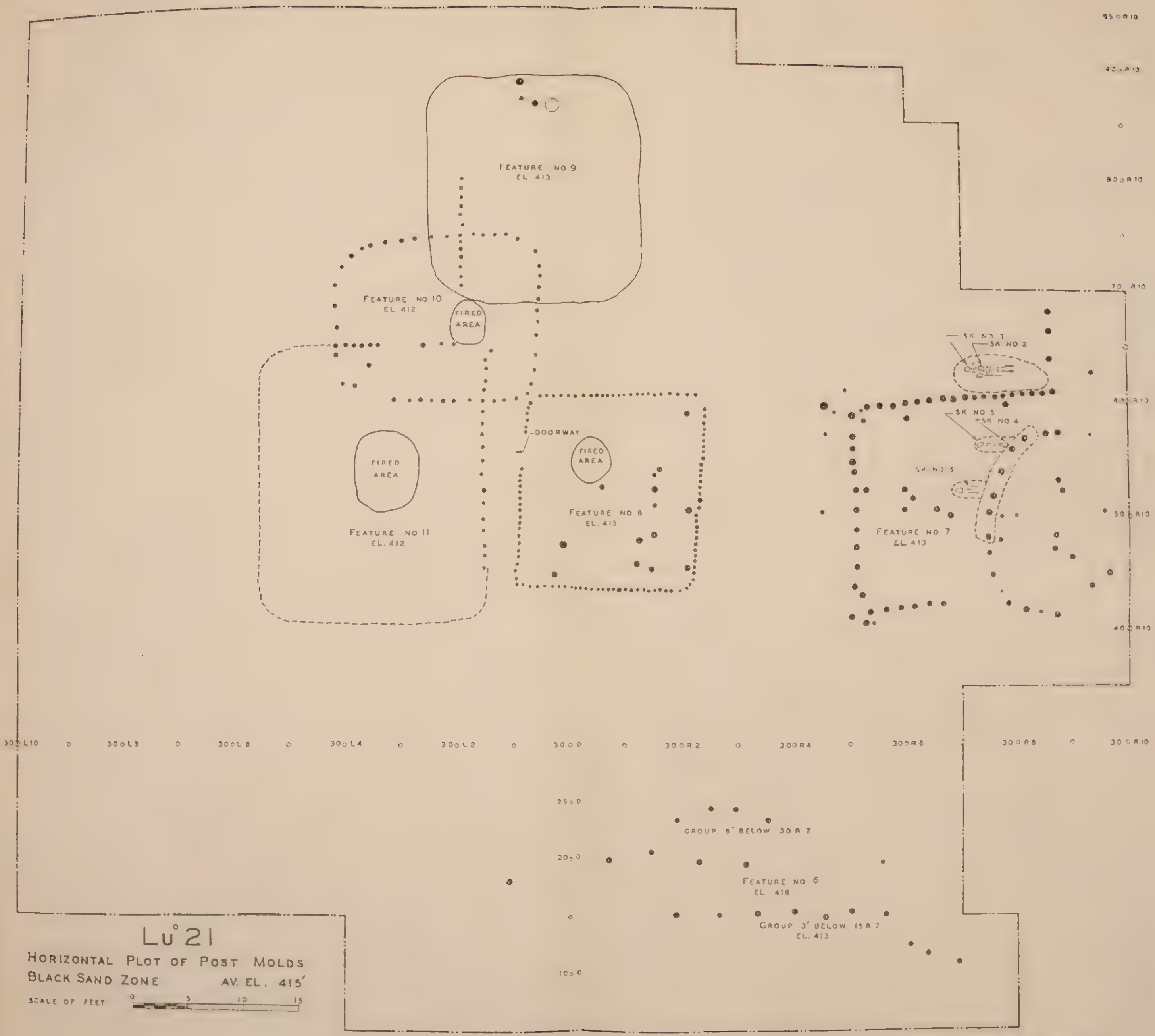

95 R10
90 R10
80 R10
70 R10
60 R10
50 R10
40 R10
FEATURE NO 9
EL 413
FEATURE NO 10
EL 412
FIRED AREA
FEATURE NO 11
EL. 412
DOORWAY
FIRED AREA
FEATURE NO 8
EL. 413
SK NO 1
SK NO 2
SK NO 5
SK NO 4
SK NO 5
FEATURE NO 7
EL 413
30 L10
30 L8
30 L6
30 L4
30 L2
30 0
30 R2
30 R4
30 R6
30 R8
30 R10
25 0
20 0
10 0
GROUP 6' BELOW 30 R 2
FEATURE NO 6
EL 416
GROUP 3' BELOW 15 R 7
EL. 413
Lu°21
HORIZONTAL PLOT OF POST MOLDS
BLACK SAND ZONE AV. EL. 415'
SCALE OF FEET
0
5
10
15

Figure 8.

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Burial No. 10.—This extended burial was in square 50R7 at a depth of 8 feet below mound surface. It had been intruded from the top of the black-sand layer under the mound into the clay hardpan. This burial is shown in plate 53, figure 2. With it were four greenstone celts, and lying on the skull was a large sherd of a utility vessel.

Burial No. 11.—In square 75-0 at a depth of 2 feet below mound surface in the black sand, was a detached skull with a small pottery bowl in association.

Burial No. 12.—This was a burial of a child extended in a pit in square 65L2 at a depth of 1 foot below "floor B"—intruded from "floor A." At the head were four pottery vessels and a small stone discoidal.

Burial No. 13.—This burial was below "floor B" in square 75L3 in an elliptical pit dug 1 foot below the floor. This burial is shown in plate 52, figure 2, protruding through the 75-foot profile, and plate 53, figure 1, shows the form of the pit. The body was partially flexed. At the right side below the pelvis was a large pottery water bottle, shown in plate 60, figure 1, at the neck a shell gorget, and at the feet a greenstone celt.

Burial No. 14—This fully extended burial was 1 foot deep in a pit below "floor B" in square 40L6. The skeleton was in a very poor state of preservation. On each side of the skull (pl. 52, fig. 1) were copper ear ornaments made of thin sheet copper spread over wooden disks. Near the chin was a copper pendant in poor state of preservation, and on the forehead a small copper disk.

Burial No. 16.—In a small pit in square 45L3 an infant was buried fully extended at a depth of 8 feet in the black sand. A large potsherd was laid over the body and at the head a pottery vessel was placed. Under the chin were found many shell beads.

ARTIFACTS

From burial associations and from general digging a total of 95 field specimens were recorded. These were distributed as follows:

Pottery vessels, complete or nearly complete	30
Large potsherds	10
Small pottery disks	19
Small stone disks—sandstone, slate, or limestone	7
Greenstone celts	5
Copper artifacts	5
Pipes	2
Flint projectile points	6
Miscellaneous artifacts	11
Total	95

Stone artifacts from this site were very few in number. Plate 59, figure 1, shows the only celts found in the excavation. The largest of diorite, with pointed pole and highly polished blade, is 8.5 inches long and 2.7 inches in maximum width. This celt and three of the others—all save the one in the center of the picture—were in association with burial No. 10. The smaller celts, varying in length from 4.7 to 3.5 inches, are of greenstone. The smaller celt, in the center of the lower row, was with burial No. 13. The six stone disks, of sandstone, limestone, greenstone, and slate, have diameters varying from 1.2 inches to 1.6 inches. Of the six flint projectile points, five were of the triangular form, and only one had a suggestion of a notched stem. This point was probably a chance inclusion in the earth of the mound and may be entirely unrelated to its builders. Plate 59, figure 1, also shows a fragment of a brown slate gorget, drilled with six small holes, and a steatite pipe. This steatite pipe, 2.5 inches in greatest dimension, is decorated with raised knobs on the bowl, and circular ring on the stem. This type of pipe, fairly common along the Tennesee River, was described by Holmes (1903, p. 74) as belonging to "the South Appalachian Group."

Plate 59, figure 2, shows 19 pottery disks, varying in diameter from 1 inch to 2.2 inches. All are made from shell-tempered sherds worked approximately to circular form. Three are drilled centrally. The pottery pipe shown in this figure is of elbow form, 2.5 inches long and with bowl 2.2 inches high. Both members are square in cross section. The bowl is 1.5 inches square on the outside, and has a 1-inch square hole which is 1.4 inches deep. The stem hole is circular and 0.9 inch in diameter. This pottery pipe was clay-grit tempered, and was found in the general digging without any burial association.

In the upper left-hand corner of this figure is shown a mud dauber's nest taken from an occupational level in the mound. The nest had been built against a log about 8 inches in diameter, as shown by the curvature of the base. The building upon which it was constructed was burned, and the nest, probably hardened by the fire, fell to the floor and was covered over. It thus remained well preserved.

Pottery constituted the outstanding artifacts from this site. Most of the 30 perfect specimens were found in burial association, as were most of the large sherds. All vessels and sherds found in burial association were shell tempered. Although there were nearly 500 clay-grit-tempered sherds found on the site, only 1 large sherd was found in the general digging. This sherd, 9.5 inches by 4.5 inches, is shown in plate 60, figure 2. Its surface is decorated with the "Complicated" stamp. It was found in square 55L1 at a depth of 3.5 feet lying on floor "A." It will at once be recognized as typical of the Georgia coast pottery. An attempted drawing restoration of the vessel, of which this sherd was a part, is shown in plate 68. The measurements of this sherd seemed to indicate a vessel 15 inches in depth and 13 inches in interior diameter. It had a slightly flaring lip and somewhat pointed base.

Plate 60, figure 1, shows the water bottle associated with burial No. 13. Its surface is decorated with concave depressions, possibly made by pressure with a finger.

Plate 61, figure 1, presents four small mortuary vessels. The vessel shown in upper right has a hard black surface and has been cross-hatched by engraving after firing. It was in association with joint burials Nos. 2 and 3. The vessel in the lower left is a frog effigy 5 inches in diameter and was with burial No. 12. The two-handled pot shown in lower right was found in association with the effigy water bottle shown in plate 63, figure 1. These vessels were not in association with any burial. They were on floor "B" in the 40-foot cut, and seem to have been intentional inclusions in the mound, placed in position at the time of its building. They are shown in situ in plate 47, figure 1. This water bottle, an effigy representing possibly a coon or bear, is 8 inches in height and has a maximum length (nose to tail) of 9 inches. The surface of this vessel, originally a cream-yellow colored clay, has been painted by the application of a light brown stain to produce the effect of circular spots. These spots—almost invisible to the eye because of the leaching effect of the earth in which the vessel was buried—are easily photographed on any film sensitive to red. The paint was applied to produce a negative image, i. e., the background was painted out leaving the image to be formed in the natural color of the clay.

Plate 61, figure 2, shows some unusual forms of mortuary vessels. The two double vessels were taken from multiple burials Nos. 2 and 3. A third vessel of this type was found in association with burial No. 4. The larger of those shown was 9.5 inches in length and 4.5 inches in width. It was 3.5 inches deep. The two halves were substantially united by a heavy bar of clay. The smaller vessel was 7.5 inches in length and 3.5 inches in width. It was further decorated by a lug near the rim at each end of its greatest diameter. Shown with these vessels are two small circular cups with ornate rim decorations. The specimen in the lower right, taken from burial No. 13, was 2.4 inches in height and 3.2 inches in diameter. The specimen in the upper left was 2.7 inches in height and 3.6 inches in diameter. These vessels seem to be rather too small to have served any useful purpose. Their size and form suggest that they might have been made solely for mortuary offerings. The ornate character of the rim lugs causes one to wonder if this was an attempt to symbolically represent the sun, since at least one group with which this site seems most nearly related are known to have incised representations of the sun on shell gorgets, and to have painted such images on pottery—particularly water bottles.

In plate 62, figure 1, is shown a water bottle 8 inches high and with maximum diameter of 6.5 inches. This specimen was with four other vessels in square 75R1 at a depth of about 6 feet in the red and blue clay loading. They were entirely out of association with any burial or feature, and seemed intentional deposits inclusive in the mound. With this bottle is shown a shallow bowl with maximum diameter of 7 inches and height of 3.2 inches. This bowl has a beaded ridge just below the rim. It was in association with burial No. 12.

Of the two small vessels shown in plate 62, figure 3, the one on the left, which was 4.7 inches in maximum diameter and 4.5 inches deep, was found in association with burials Nos. 2 and 3. The pot on the right, with diameter of 5.2 inches and height of 3.2 inches, was with burial No. 6.

With burials Nos. 2 and 3 was an owl-effigy water bottle. This large bottle had been completely crushed by the weight of earth above it. The sherds were so softened, and decay had proceeded so far, that the contacts at the edges of the sherds had largely disappeared. Restoration was therefore impracticable. The head of this effigy is shown in plate 63, figure 2, and a drawing restoration of this vessel is shown in plate 65, figure 2. This vessel appears to have been 14.5 inches in height and 11.5 inches in diameter.

While much interest attaches to the pottery complex as represented by complete vessels and large sherds, all of which were shell tempered with one exception—the sherd shown in plate 60, figure 2—yet much can be learned from a study of the broken sherds included in the mound. From this site it was convenient to classify 7,197 sherds as to type and depth in the mound. These results are presented in the following table 3:

TABLE 3.—*Pottery distribution by type and levels*

Foot levels	Temper					Total	Specimens of wattle
	Shell	Clay-grit	Lime	Sand	Fiber		
1	664	87		2		753	93
2	1,461	130		2		1,593	44
3	1,413	89	2	1		1,505	110
4	1,025	57	3	2		1,087	10
5	1,586	20	2	1		1,609	18
6	302	47				349	48
7	173	11	5		1	190	8
8	60	6				66	2
9	19	3	3			25	
10	19	1				20	
Total	6,722	451	15	8	1	7,197	333

This seems to show that the occurrence of sand-, lime-, and fiber-tempered ware on this site was negligible and purely the result of trucking-in of a very few vessels. Obviously, shell-tempered ware was dominant. Since the shell-tempered sherds are found from top to bottom, it would seem that a considerable length of occupancy by the makers of this pottery had taken place before the mound was built, and there was a plentiful supply of shell-tempered sherds on the area to be incorporated in the mound wherever the earth was gathered for mound building. Investigations at this site seemed to show that in the village about this mound there was a black-sand layer in which the clay-grit-tempered pottery was dominant. Since this type clearly preceded the coming of the shell-tempered pottery people, it is easy to understand that in the erection of the mound, first from the surface earth and later by going deeper into the old village, the clay-grit sherds began to appear in greater numbers in the top of the mound. This is because they were below the shell-tempered zone in the old village. No extensive investigations of this village was possible, first, because crops were being grown on the area up to the time the title passed to the Tennessee Valley Authority, and later, time did not permit its investigation, since rising water almost prevented the completion of the mound investigation.

Rim sherds with beading just below the rim were quite common. Typical rim and body sherds from this site are shown in the two upper rows of plate 64, figure 1. The lower row, with one exception, presents clay-grit-tempered sherds taken from the old black-sand village layer. The small sherd, second from the left in lower row, is sand tempered. Plate 64, figure 2, presents a number of handles, lugs, and rims typical of this complex. In the lower row on right are shown sample sherds of wattle work.

Occasionally, in the general digging, sherds were found large enough to give a fairly accurate concept of the shape of vessel of which they were a part. A number of these have been subjected to careful measurement, and drawing restorations of the vessels have been made. These restorations are shown in plates 65 to 68, inclusive. In every case the size of the original sherd has been indicated by a boundary line, and one may judge of the probable accuracy of the restoration by the size of the sherd. Obviously, the larger the sherd, the more accurate the measurement. In some cases, it is necessary to resort to information as to size and shape of similar vessels known to have been made in such associations. In other cases, information has been taken from several sherds from different vessels of the same type as an aid in producing increased accuracy in drawing restoration.

In particular, plate 67, figure 1, is a drawing restoration of a water bottle of height 5.75 inches and maximum diameter of 5.25 inches, from three associated sherds found together in the general digging. This bottle is of the polished black surface ware of Moundville (Moore, 1907, p. 375) with very fine shell temper. One of the body sherds had the body and parts of wings of the "flying serpent" reported by Moore. The artist has therefore borrowed the concept from figure 61, page 375, Moundville Revisited, to enable him to reconstruct this water bottle.

Plate 58, figure 2, shows two broken and two nearly perfect stone pendants. The three on the right of this figure are from Moundville. The broken one on the left was found in the general digging at this site. Before this pendant was broken, it doubtless also carried the "hand-eye" design so common at Moundville. This broken fragment is 1.1 inches broad and 0.9 inch long. The largest complete specimen from Moundville is 4 inches long.

CONCLUSIONS

As pointed out above, the first occupants of this site had a village on a layer of river-deposited sand laid directly on the hardpan. Here in this black sand containing shell, charcoal, and the usual evidence of a village, they scattered clay-grit-tempered potsherds and occasional sherds of limestone, sand, or fiber temper. Who these people were we do not certainly know; they left no flint artifacts and little else to identify them. The clay-grit-tempered, square elbow pipe, probably belongs to this occupancy. This may have been a somewhat transient occupancy by some of the very late shell-mound people who by that time had acquired clay-grit-tempered pottery. Whoever they were, their stay was seemingly short, and besides leaving some potsherds they left very little else. Then began the real occupancy of this site by a shell-tempered pottery people. After this occupancy had been long continued—as shown by the village, post molds, and burials—they determined to erect the mound. This they did by carrying up earth from their own village and from that of the clay-grit-tempered pottery people which lay beneath. Some of this first village material thus became included in the top of the mound.

The builders of this mound may best be characterized by the following list of traits which seems to represent their culture pattern so far as it is determinable from this site alone.

Builders of Earth Mound

General traits:
  - Domiciliary mound.
  - Mounds truncated pyramids of clay.
  - Occupational levels on top of clay pyramids.
  - Rectangular post-mold patterns.
  - Posts set separately—not in trenches.
  - Wattle-work walls in later occupancy.

Burial traits:
  - Burials in pits cut through house floors.
  - Burials extended.
  - Burials partially flexed.
  - Burials usually with artifact.

Stone artifacts:
- Greenstone celts (5).
- Stone disks—small game stones (6).
- Steatite pipe, elbow, with knobs (1).
- Stone pendant (pl. 58, fig. 2) (1).
- Triangular projectile points, small (4).
- Circular embossed copper ear ornaments (2).
- Copper pendant (1).

Pottery traits:
- Pottery, all shell tempered.
- Very small vessels used with burials.
- Pottery disks, circular, small (17).
- Pottery disks, small, centrally drilled (3).
- Twin vessels (3).
- Slender-neck water bottles (2).
- Zoomorphic pottery effigies (3).
- Coon water bottle painted (1).
- Owl-effigy bottle (1).
- Frog-effigy pot (1).
- Doubled rim lug on large pot (1).
- Round handles.
- Strap handles.
- Beading on pots below rim.
- Duck-head effigy.
- Large-mouth water bottle, black surface, circular bosses, and pedestal base (1).
- Large-mouth water bottle, flying serpent (1).

An inspection of this trait list will suggest further connection with Moundville. Besides the stone pendant and water bottle with the engraved flying serpent mentioned above, other similarities with traits reported by Moore (1905) from Moundville are to be noted. The following list designates artifacts by figure number herein and shows page and figure used in presenting similar material in Moore's report on excavations at Moundville.

Artifacts:	Plate herein	*Moundville report* Figure	*Moundville report* Page
Flared-rim vessel	62, fig. 2	13	142
Water bottle, engraved	60, fig. 1	37	160
Copper ear ornament	52, fig. 1	40	162
Frog-effigy pot	61, fig. 1	78	185
Steatite pipe	59, fig. 1	95	192

This list might be increased if desired.

It would seem certain, therefore, that the builders of this mound were culturally related to the people of Moundville They seem also to have contacts with other people of their day, as evidenced by the large sherd of complicated stamped ware, which may have come from the Georgia coast region, and the twin vessels, which may indicate contacts with the Tennessee-Cumberland cultural complex.

It would seem probable that the occupancy of this site was contemporaneous with other sites on the Tennessee River which seem more closely related to the culture pattern of Moundville.

PERRY SITE, LU° 25, UNIT 1

This site is a shell mound about 500 yards from the upper end of Seven Mile Island. It is near the northern shore of the island about 100 feet from the slough, as shown in plate 70, figure 1. The shell deposit covers an area of about 200 feet E.–W., by about 300 feet N.–S. Its surface rises to a height of about 10 feet above the surrounding fields which have long been in cultivation. The island was formerly owned by Frank Perry of Florence, Ala., who had erected a tenant house and barns on the shell midden, which was the highest point in the vicinity. This had caused some disturbance of the surface of the midden but had prevented excessive erosion by preventing cultivation. The topography showed merely this elevation of shell on the flat flood plane of the island. In recent times of very high water, the island was covered, and the shell mound alone projected above the flood. Investigation showed that during its building, this shell midden had been many times submerged, and silt deposited over it. On the east end of the island, and also on the south side within 500 yards of this site, are other prehistoric shell banks. They are of somewhat smaller size, and being nearer the river, have been somewhat more eroded.

At the time of excavation in the summer of 1938, the buildings had been removed and the whole site was covered by a heavy growth of Johnson grass.

Figure 9 is a ground plan of the excavation. Since the north side of the midden, which was only about 100 feet from the river, was rather steep, it permitted easy disposal of slack dirt. Trenching was, therefore, started on the northern edge. The area was staked in 5-foot squares (pl. 70, fig. 2) and a zero trench 240 feet long was cut down to undisturbed sand (pl. 71, fig. 2). The L1 cut was then removed. From the profiles revealed, the natural zones in this midden could be determined. Figure 10 shows a profile of the zero trench.

Since the "block" technique had been found to yield good results in determining stratigraphy in shell middens, it was determined to use it at this site. Block No. 1 was laid off 30 feet square, as shown in plate 73, figure 1, and the 40-foot, 45-foot, 80-foot, L1, and L8 cuts were taken down in 1-foot levels to isolate block No. 1, as shown in plate 73, figure 2. Block No. 1 was taken down by natural zones in 6-inch levels. Later, blocks Nos. 2 and 3 were isolated in turn and each was taken down by natural zones, in 1-foot levels (pl. 76, fig. 2; pl. 77, fig. 1; pl. 87, fig. 2).

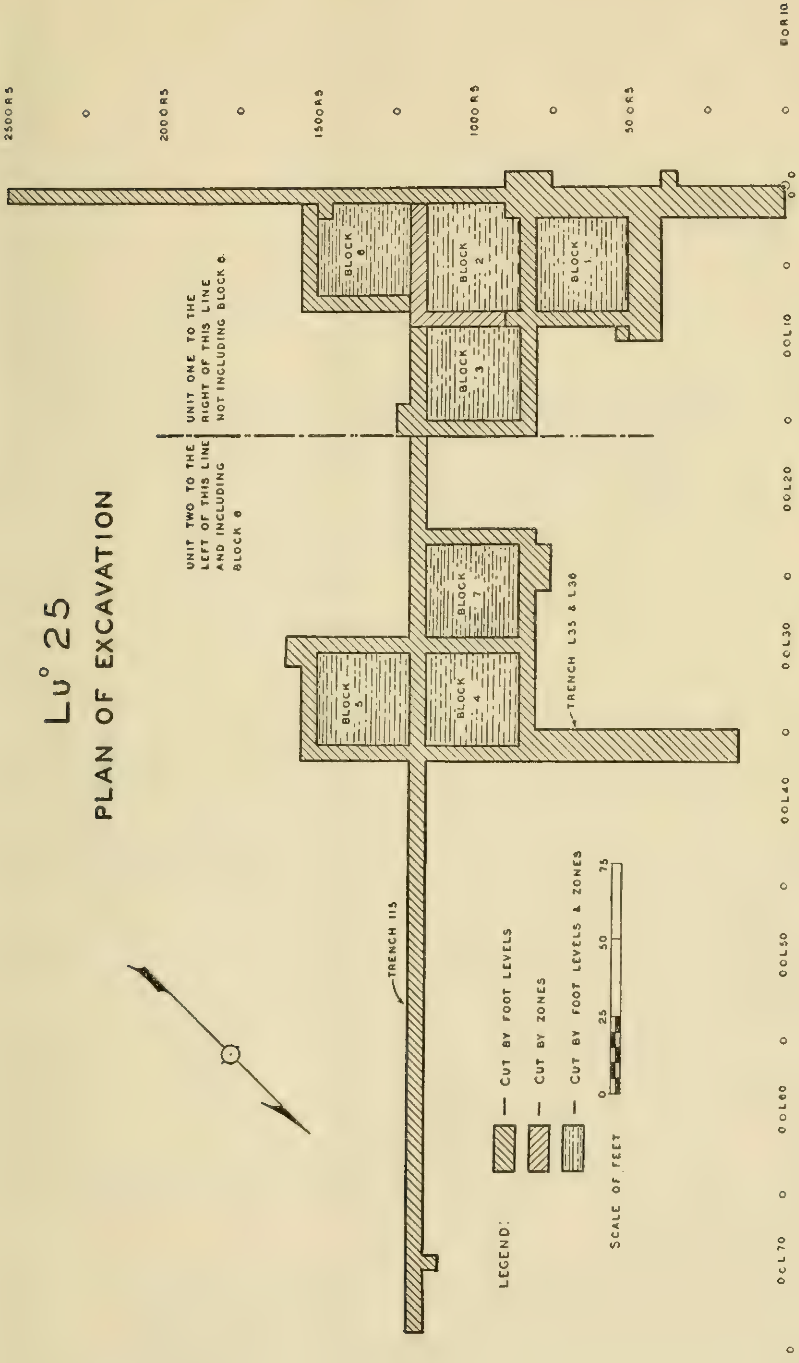

Lu° 25
PLAN OF EXCAVATION
UNIT ONE TO THE RIGHT OF THIS LINE NOT INCLUDING BLOCK 6.
UNIT TWO TO THE LEFT OF THIS LINE AND INCLUDING BLOCK 6
BLOCK 6
BLOCK 2
BLOCK 1
BLOCK 3
BLOCK 7
BLOCK 5
BLOCK 4
TRENCH L35 & L36
TRENCH 115
LEGEND:
— CUT BY FOOT LEVELS
— CUT BY ZONES
— CUT BY FOOT LEVELS & ZONES
SCALE OF FEET
0
25
50
75
2500R5
2000R5
1500R5
1000R5
500R5
00R10
00L10
00L20
00L30
00L40
00L50
00L60
0cL70

FIGURE 9.

Profiles on all four sides of each block were drawn and are shown in figure 11. Obviously, the ends of the two extreme sections in each profile are identical and should "match." Thus, if one would fold the profiles at the four corners, it would be possible to obtain a three-dimensional concept of the natural zones in each block and thus obtain some idea of how the midden was laid down.

It was found convenient after the completion of block No. 3 to regard blocks Nos. 1, 2, and 3 with their associated trenches as *Unit 1* and to study this portion of the excavation as if it were a completed site. At the same time, however, it was determined to extend the 115-foot trench, shown on the right in plate 89, figure 2, eastward further into the mound to enable an investigation of the natural zones in that portion of the midden to be made, and additional blocks to be isolated and studied. These extensions of the 115-foot trench with the excavations associated therewith, are designated as Unit 2. The 115-foot trench is shown staked out beyond block No. 3 in plate 102.

NATURAL ZONES

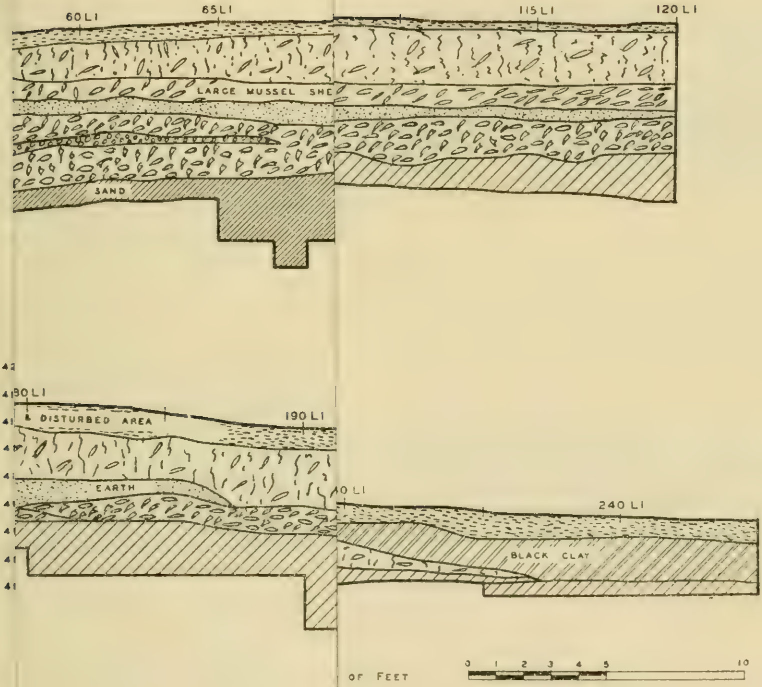
From plate 73 and plate 72, figure 2, it is apparent that this site, like all other shell middens, has natural zones produced by a variation in the concentration of shell in relation to the amount of sand, clay, ashes, and other debris. Natural zones are so obvious, and seem so likely to represent a cultural or ecological change in the dwellers on the midden, it would be quite foolish to ignore them; yet experience seems to indicate that often—perhaps generally—these zones are, from the standpoint of stratigraphy, not nearly so important as they might appear. In block No. 1, the zones were designated on the L2 profile as A to E, inclusive. As excavation advanced, zone D pinched out and zones C and E combined to form one zone, designated as "zone E."

Zone A was about 3.5 feet thick. The top foot of zone A contained much black humus mixed with the shell, and many evidences of white occupation as the result of the surface having been in cultivation, and the top of the mound having been a farmyard. Below this phase there was a layer of shell with much ashes, bone, rubble, and black earth which formed a very compact zone about 1.5 feet thick. Below this there was a layer of reasonably clean shell. This was not so compact, and the shell, mostly pelecypods, contained very little midden material. It was this phase of zone A that later was shown to be almost sterile of artifacts.

Zone B was a layer of very dark clay loam about 0.5 foot thick. It was laid almost level and may have been water-deposited. It contained much cultural material, and its upper surface had once been a general occupational level, as demonstrated by numerous fired areas.

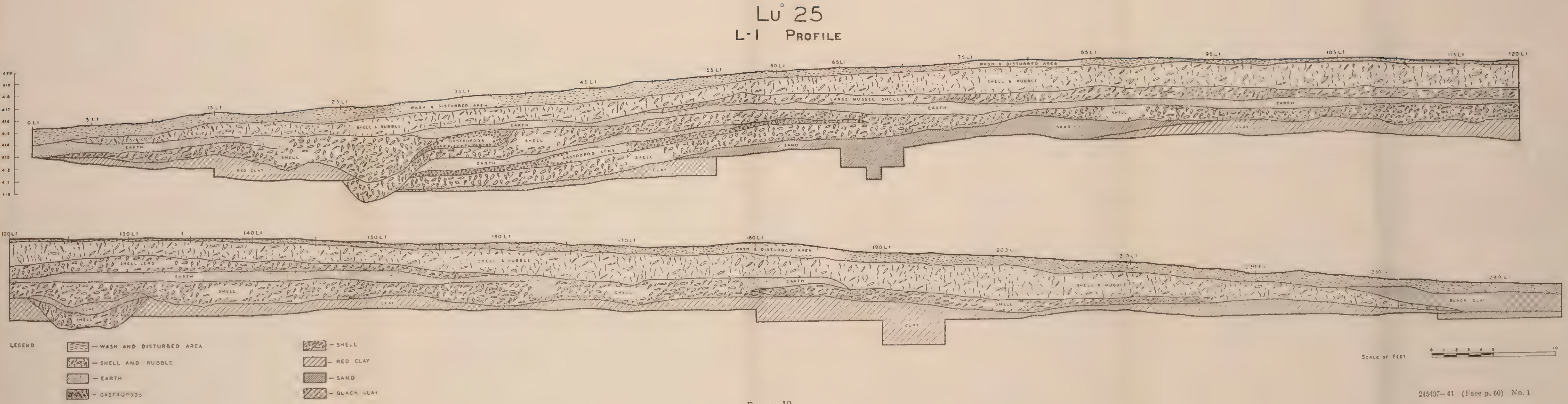
Lu° 25

-1 PROFILE


60 L1
65 L1
115 L1
120 L1
LARGE MUSSEL SHE
SAND
42
41
30 L1
DISTURBED AREA
190 L1
EARTH
0 L1
240 L1
BLACK CLAY
OF FEET
0
1
2
3
4
5
10

IGURE 10.

245407—41 (Face p. 60) No. 1


Lu° 25
L-1 Profile
ELEV 420
0 L1
5 L1
15 L1
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85 L1
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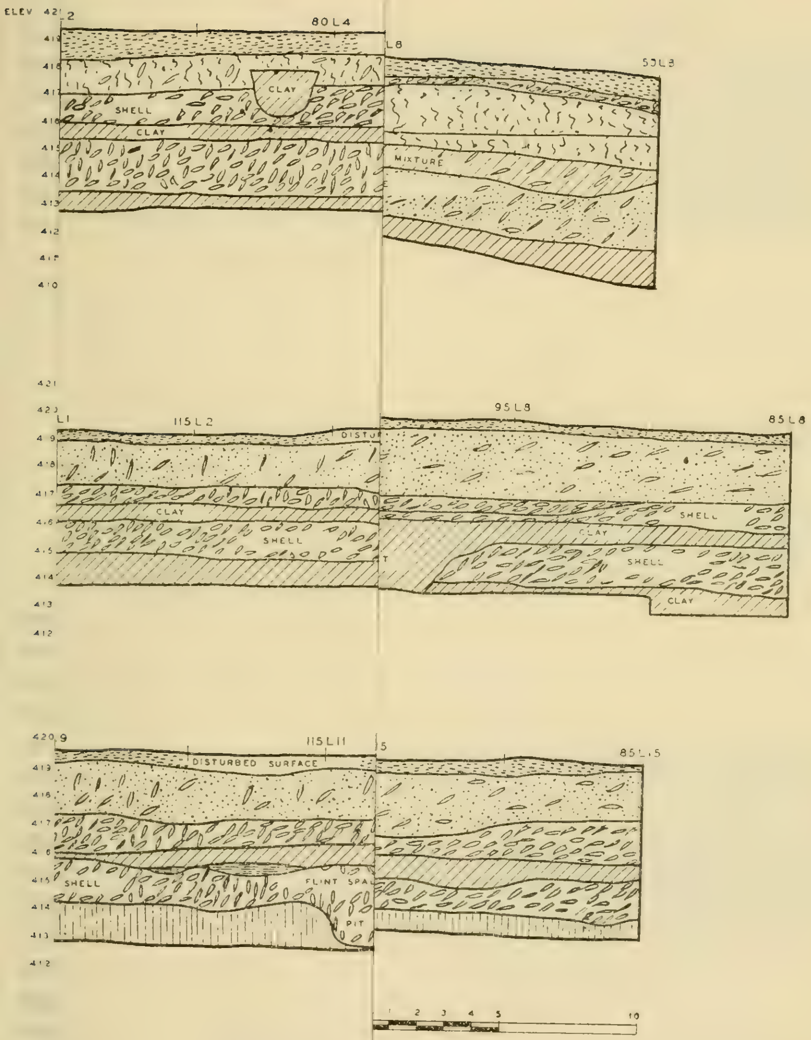
105 L1
115 L1
120 L1
130 L1
140 L1
150 L1
160 L1
170 L1
180 L1
190 L1
200 L
240 L1
WASH & DISTURBED AREA
SHELL & RUBBLE
EARTH
SHELL
LARGE MUSSEL SHELLS
GASTROPODS
GASTROPOD LENS
SAND
CLAY
RED CLAY
SHELL LENS
BLACK CLAY
LEGEND
— WASH AND DISTURBED AREA
— SHELL AND RUBBLE
— EARTH
— GASTROPODS
— SHELL
— RED CLAY
— SAND
— BLACK CLAY
SCALE OF FEET
0
1
2
3
4
5
10

Figure 10.


ELEV 421
2
80L4
L8
55L8
419
418
417
416
415
414
413
412
411
410
CLAY
SHELL
CLAY
MIXTURE
421
420
L1
115L2
DISTUR
95L8
85L8
419
418
417
416
415
414
413
412
CLAY
SHELL
T
CLAY
SHELL
SHELL
CLAY
420.9
115L11
5
85L5
DISTURBED SURFACE
419
418
417
416
415
414
413
412
SHELL
FLINT SPA
PIT
1
2
3
4
5
10

URE 11.

245407—41 (Face p. 60) No. 2

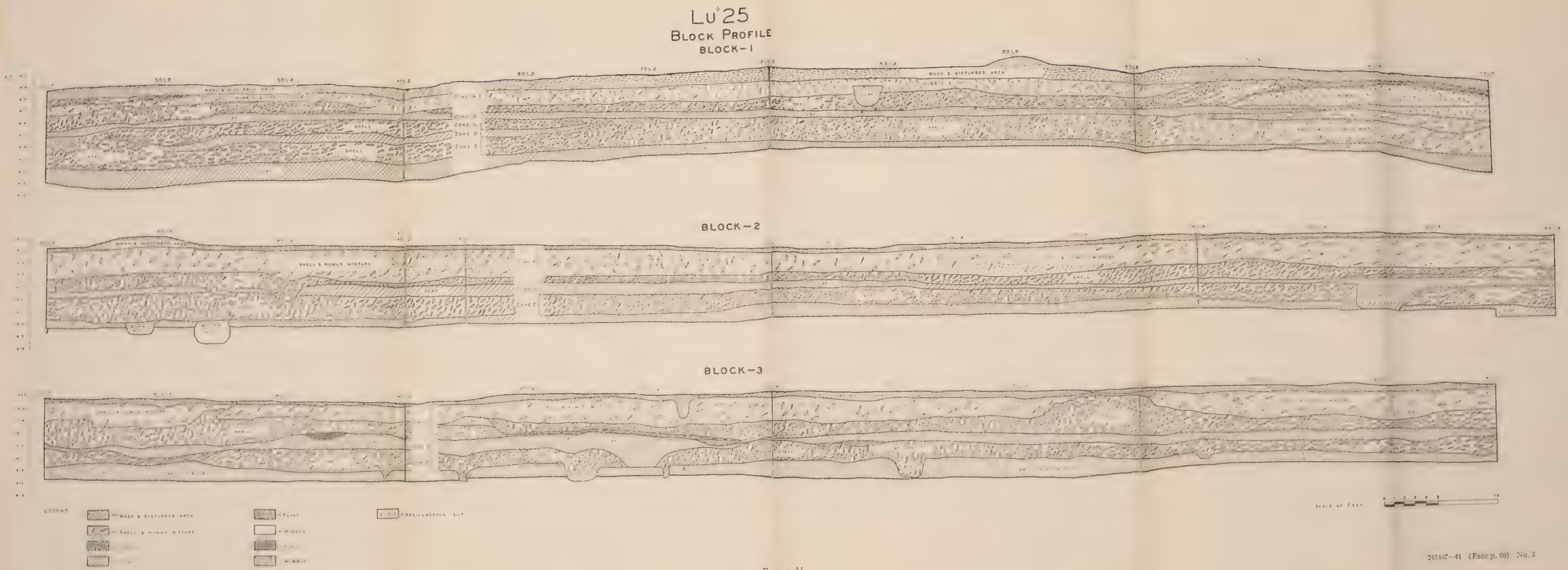

Lu°25
Block Profile
BLOCK-1
50L6
50L4
40L2
60L2
70L2
80L6
80L8
Wash & disturbed area
Zone A
Zone B
Zone C
Zone D
Zone E
Shell
Clay
BLOCK-2
Wash & disturbed area
Shell & humus mixture
Clay
Zone E
Shell
BLOCK-3
Legend
Wash & disturbed area
Shell & humus mixture
Flint
Midden
Argillaceous silt
Scale of feet
0
1
2
3
4
5
10

Figure 11.

Zone C was a shell lens of almost pure shell. It was about 1 foot thick and contained some ashes and cultural material.

Zone D was a clay layer about 0.5 foot thick, very similar to zone B in appearance. It contained artifacts and other evidence of occupation, but its upper surface did not present fired areas like zone B.

Zone E was a layer of shell and clay, very hard and compact, about 2 feet thick. It rested on undisturbed water-laid sand. Many pits had been dug from zone E into the clear sand below the midden base. Some of these pits were used for burial and others seem to have been intended for storage. Plate 91, figure 1, shows the appearance of these pits marked by shell-filled areas in the sandy clay below the midden in block No. 3. Plate 91, figure 2, shows these pits open, some containing burials.

FEATURES

In Unit 1 there were designated 33 features, classified as follows:

Kitchen-midden pits	14
Groups of post molds	6
Flint workshops	2
Rock caches	4
Fired-clay pits	5
Crematory pits	2
Total	33

Of the 14 features designated as "kitchen-midden pits," 12 were near the bottom of the mound, 6 to 7.5 feet deep, and generally extended into the clay or sand below the mound base. One of these pits was at a depth of only 1.7 feet. They were generally about 3 feet wide and about 2.5 feet deep. They were filled with burned bone, charcoal, broken artifacts of bone and flint, and were generally distinguished by having a concentration of midden material as contrasted with pure shell debris. Such pits may have served at one time as storage bins and when their use was discontinued they became filled with kitchen-midden material. Feature No. 1 is presented in plate 72, figure 2, and feature No. 4 is shown in plate 78, figure 1.

It often happens that post molds are found extending through occupational levels. Such levels are sometimes made on clay floors, the clay seemingly having been carried in and laid horizontally over a small area. Usually when post molds penetrate such a clay lens there is an associated fireplace, or burned area on the clay. The post molds in the six features so designated, did not form any recognizable pattern in any feature. Sometimes the boundary surface between two natural zones may show post molds, such as feature No. 19 on the top of zone B in block No. 3, shown in plate 89, figure 1. Here again, post molds indicate that some kind of structure occupied the area, but no pattern is discernible.

Two features were designated "flint workshops." These were areas covered with flint chips, spalls, and rejects. One of these areas, feature No. 15, was 4 feet deep in square 100L1 and the other, feature No. 25, was 6 feet deep in square 90L11.

Four features were caches of river-worn pebbles of considerable size with from four to nine stones in each cache. In one of these caches the water-worn stones showed the action of hammers, which seemed to indicate they had been used as anvil stones.

Five features designated as "fire basins" were shallow depressions showing the effect of fire. Clay was burned red, and usually there was a layer of ashes and charcoal over the clay. Often, fire-cracked stones were found in the ashes, as well as burned animal bones.

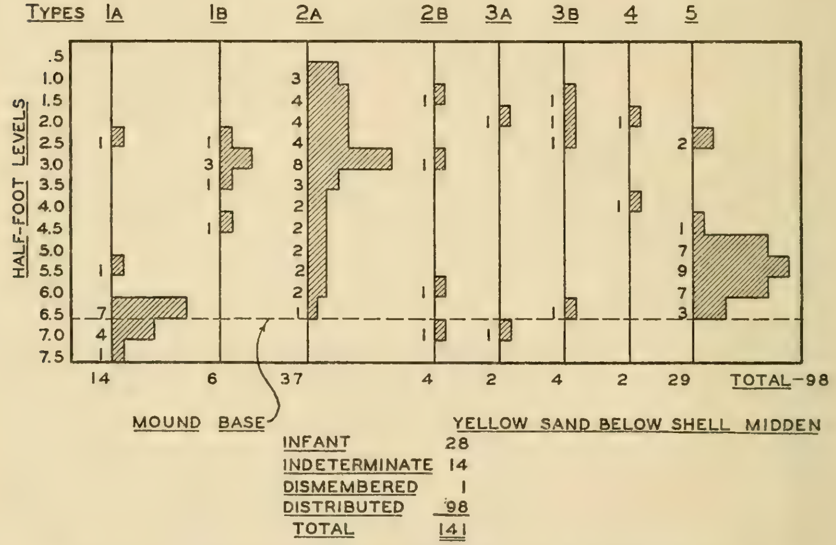


FIGURE 12.—Depth distribution of burials by types in site Lu° 25, Unit 1.

Two features, Nos. 7 and 32, perhaps deserve special description. Feature No. 7 was designated a "crematory pit" or "fire basin." It was 4 feet below square 85L2. This feature is shown in plate 82, figure 1. It was a circular pit about 3 feet in diameter, worked out in zone B. The pit was completely filled with black ash from which the charred fragments of a human skeleton (burial No. 85) were taken. The bottom of the pit was covered with a thin layer of flint chips carefully disposed. The whole basin above the ashes had been covered with a 3 inch-thick layer of sandy clay. Feature No. 32 was a pit 7.2 feet below the surface in square 95L1. This pit was circular in form, 2 feet in diameter and about 1.6 feet deep. The upper portion of the pit contained flint chips and charred cane. The floor of this pit was covered with sandstone and limestone rocks showing the effect of fire. Above these stones was a layer of charred bone nearly a foot thick. This bone was so thoroughly burned it was not possible to certainly determine its source, but since the basin had a similar appearance to feature No. 7, it was deemed to have been a crematory pit.

BURIALS

In Unit 1, 141 burials were found. These were distributed as to type as follows:

Round grave, type 1a	14
Round grave, type 1b	6
Partially flexed, type 2a	37
Partially flexed, type 2b	4
Extended, type 3a	2
Extended, type 3b	4
Cremation, type 4a	2
Sitting posture, type 5	29
Dismembered body	1
Indeterminate	14
Infants	28
Total	141

No attempt was made to assign infant burials to type. The indeterminate burials are those which, due to postburial disturbance are in such condition that their original placement could not be determined. There is always a considerable proportion of these in any shell mound due to the considerable amount of aboriginal disturbance of the shell. Eight of these burials were headless. Two other burials had heads disarticulated, but in the vicinity of the body. (See pl. 74, fig. 2.) Headless burials seemed to have no significance as to depth distribution.

Of the 141 burials, 89 were without any associated artifacts. Of the remaining 52 burials, 27 had only beads of shell or jasper, or both. Only 25 burials had other artifacts. Of these, 9 had only flint projectile points or knives found in the vicinity of the skeleton. Intentional association of such flint objects may be doubtful. No pottery vessel or large sherd was found in any certain association with any burial, but a broken steatite vessel was found with one burial, No. 90. Of these burials, those of special form or having artifacts in association have been separately described.

Burial No. 2.—This burial of type 2a at a depth of 2 feet in square 40–0, was notable in that a flint projectile point was found imbedded in the proximal end of the right humerus. This association is shown in plate 101, figure 1. This burial was closely associated with burial No. 3. Both were adult males and are shown in plate 75, figure 1.

Burial No. 4.—This was a type-2a burial of a girl about 13 years old, at a depth of 2 feet in square 65–0. It is shown in plate 75, figure 2. With it were two flint points, a bone projectile point, and a large tubular pipe, shown as the central object in plate 94, figure 1.

Burial No. 5.—This type-2a burial was 2 feet deep in square 60–0. With it were one flint projectile point and four bone projectile points.

Burials Nos. 8 and 9.—These burials were together in the same grave. Burial No. 9 was an infant and burial No. 8 appeared to be a type-5 sitting burial which had slumped forward. With it were two flint projectile points. At a distance of about 2 feet from the head of this burial was found a grooved ax. This may have been in association, but the intentional association is by no means certain.

Burial No. 10.—This burial of a child, type 5, was at a depth of 5 feet in square 135L1. With it was a necklace of shell beads. The eight long cylindrical shell beads shown in plate 96, figure 1, are a part of this necklace.

Burial No. 11.—This burial, at a depth of 5 feet in square 120–0, had no artifacts in association but is shown in plate 71, figure 1, and also in plate 71, figure 2, in the zero trench, as a good example of the sitting-posture burial, type 5.

Burial No. 12.—This infant was buried at a depth of 5 feet in square 115–0. With it was a necklace of shell and jasper beads. These small beads are shown to the left of the small shell gorget in plate 96, figure 1.

Burial No. 14.—This was an adult burial, type 5, at a depth of 5 feet in square 110–0. It had a necklace of shell and jasper beads.

Burials Nos. 22 and 23.—These two burials, typical sitting burials, type 5, were placed side by side at a depth of 5.5 feet in square 145L1. They are shown in plate 72, figure 1. Burial No. 22 on the left is a female and burial No. 23, on the right, is a male. With burial No. 23 there were two flint projectile points.

Burial No. 38.—This extended burial, type 3a, was at a depth of 7 feet in square 80–0. It lay face downward in a pit which had been dug into the sand below the mound. The pit extended into the sand for a depth of 1 foot. The pit was somewhat too short to accommodate the body, so the lower limbs were left protruding upward at the foot of the grave pit. This burial is shown in plate 74, figure 1. When first excavated, this skeleton had a necklace of red stone (jasper) beads. Before the grave could be completely cleared for photography, an "off-hours" visitor to the site removed as much of the necklace of beads as he could find, leaving only two long cylindrical jasper beads under a portion of the skeleton. This skeleton was complete save for portions of each foot, which were missing.

Burial No. 53.—This was a burial of an infant at a depth of 4 feet in square 75L3. The burial was made in yellow sandy clay placed in a pit. The clay extended to within 2 feet of the mound surface. Immediately surrounding the skeleton was a covering of mussel shells and with the skeleton was a shell pendant. This is shown in the center of plate 96, figure 1.

Burials Nos. 56, 57, 58, 59, and 60.—This group burial of five individuals—one infant, one child, and three adults—all type-2a burials, was 3 feet deep in square 70L4. With the infant burial, No. 56, was a necklace of dentalium shell beads. This necklace is shown second from the top in plate 96, figure 1. With burial No. 58 was a tubular pipe. This burial is shown in the foreground in plate 76, figure 1, which presents this group of burials.

Burial No. 62.—This extended 3b type of burial was 6.2 feet deep in the profile of square 85L8. It was an adult male that had no artifacts but was interesting because the right arm was entirely missing, and the head was detached and buried at the same level, about 4 feet removed from the body and at least 5.5 feet from its natural position. This burial is shown in plate 74, figure 2.

Burial No. 63.—This was a redeposit of cremated remains of many individuals. It was placed at a depth of 2 feet in square 115L6. It is shown in plate 77, figure 2.

Burial No. 66.—This was a burial of a dismembered body. The bones of the members were in anatomical order, but the members which were present were in disarray. It consisted of the legs and lower half of the trunk and two arms. Each arm was complete and had attached to it a portion of the scapula. This burial was made in an elliptical pit 3 by 5.5 feet and 1.5 feet deep, in the yellow sand below the mound. The bottom of the pit was 7.5 feet below the mound surface in square 85L2. The burial is shown in plate 79, figure 1. Two broken flint points and portions of a slate gorget were found in the earth of the pit and a flint point was found lying by the left innominate.

Burial No. 71.—This was a type-5 burial, 6.5 feet deep in square 115L9. With it was a necklace of seven shell and six jasper beads. A portion of this necklace is shown to the right of the pendant in the center of plate 96, figure 1.

Burial No. 72.—This was a type-5 burial at a depth of 5.5 feet in square 110L8. It had no artifacts in association but is presented in plate 79, figure 2, as a good example of what happens to a sitting burial, due to slumping.

Burials Nos. 73, and 74.—These were two round-grave burials, type 1a. They were placed one over the other, No. 73 on top, as shown in plate 78, figure 2. This burial was in a pit 7.5 feet below mound surface in square 80L6. Burial No. 74, which was immediately under burial No. 73, is not seen in the figure.

Burial No. 76.—This type-5 burial was 6 feet deep in square 115L3. It is shown in plate 80, figure 1. It was accompanied by a long string of disk shell beads with long cylindrical beads of stone and shell and a cache of small gastropod beads (*Anculosa*). The manner of their placement is shown in plate 80, figure 2. The two strings of beads on top and bottom of plate 96, figure 1, represent a small portion of the total number.

Burial No. 84.—This type-2a burial was 4 feet deep in square 105L5. With this burial were a bone needle, a bone awl, and a tubular pipe. This burial is shown in plate 81, figure 1. Pathological condition of this skeleton was obvious. There was complete fusion of innominates to sacrum. The lumbar vertebrae were fused in pairs, as shown in plate 81, figure 2. Two of the thoracic vertebrae also were fused.

Burial No. 85.—This was a cremation, type 4a, at a depth of 4 feet in square 85L2. It was represented only by fragments of bone taken from feature No. 7, shown in plate 82, figure 1.

Burial No. 86.—This was a type-5 burial at a depth of 5.5 feet below stake 105L7. There were no artifacts in association but the skeleton was interesting because the skull had been drilled through the left parietal. This burial is shown in plate 83, figure 1.

Burial No. 87.—This was a type-5 burial at a depth of 5.5 feet in square 105L7. This burial is shown in plate 86, figure 1. With it was a string of stone beads.

Burial No. 88.—This was an infant at a depth of 5.4 feet in square 90L7. There was with this burial a necklace of stone and shell beads. This is shown as the top string in plate 96, figure 2.

Burial No. 90.—This burial was 3 feet deep in square 120L15. It was an infant but its placement could not be determined. The burial was covered with three large water-worn sandstone boulders and by large sherds from a steatite vessel. The burial is shown in plate 84, figure 1, and in plate 84, figure 2, with the covering rocks removed. With the burial were many shell beads, a terrapin shell, and a large limestone celt. The steatite vessel is shown restored in plate 98, figure 2. These beads are shown in the two lower strings at the bottom of plate 96, figure 2.

Burial No. 92.—This type-2a burial was only 1.4 feet below the surface in square 85L15. With this burial, shown in plate 83, figure 2, were 43 objects listed as field specimens. Among them were six flint points, six flint knives, three bone awls, a slate whetstone, an antler spear point, and a series of antler drifts of various sizes. Two of these were drilled horizontally in such a way as to suggest they were used as shaft straighteners. This collection of tools might at once suggest that this man in life had been specially skilled in the working of flint. Some of these flint points with this burial were especially well made, and are shown in plate 92, figure 2. These associations, made of bone and antler, are shown in plate 97.

Burial No. 94.—This was a type-5 burial at a depth of 4.6 feet below square 110L1. With this burial was a string of six long cylindrical shell beads. The skull had a hole drilled in the left parietal.

Burials Nos. 95 and 96.—These two burials near together, but not associated, were of type 5. Burial No. 96 had a large sandstone boulder covering the skull. This burial was 5.3 feet deep, while burial No. 95 was 5.5 feet deep, both in square 110L4. Each of these burials had a necklace of shell beads. They are shown in plate 85, figure 2.

Burial No. 107.—This was a type-1a burial 6.5 feet deep in square 110L6. With this burial was a flint point and a string of shell and stone beads. This string of beads is shown as the inside rectangle in plate 95, figure 2.

Burial No. 110.—This was a type-1a burial at a depth of 6.3 feet in square 100L2. With it were a flint point and a necklace of shell beads.

Burials Nos. 111 and 112.—Burial No. 111 was a type-5a burial, and No. 112 was a type-1a burial. Both were at a depth of 6.6 feet, the first in square 85L2 and the latter in square 95L2. They are shown in plate 86, figure 2. With burial No. 112 there were stone beads about the neck.

Burial No. 113.—This was a type-5 burial at a depth of 6.3 feet in square 95L4. With it were shell beads, a broken celt, a bone awl, and a flint point.

Burial No. 121.—This designation was assigned to a reburial of disarticulated bones which occurred at a depth of 1.4 feet in square 90L10. When these bones were removed to the laboratory and cleaned it was found that this group of bones represented at least seven individuals; two infants, one adolescent, and four adults. With these bones were found a flint knife, two flint points, and a bone needle. This deposit of bones is shown in plate 88, figure 1.

Burial No. 125.—This type-2a burial was 1.5 feet deep in square 90L12. On the breast there was a shell gorget, and nearby, two small shell pendants. There were also in the grave a flaked point, a cut bone implement, and a necklace of shell beads.

Burial No. 126.—This was a type-1b burial at a depth of 4.3 feet in square 80L9. It is shown in plate 88, figure 2. With it were antler drifts, a flint point, and shell beads.

Burials Nos. 130 and 131.—These type-2a burials were at a depth of 5.5 feet in square 110L9. They were buried close together facing each other and evidently represent a multiple burial of a man and a woman. This burial is shown in plate 90, figure 2. With these burials were found an antler flaking tool, a bone fishhook, and two flint points.

All of these were from the midden material filling the grave and are of doubtful intentional association.

Burial No. 134.—This round grave, type-1a burial was 6.1 feet below 100L11. The head had been removed before burial and was missing. However, at the neck was a string of shell and stone beads.

Burial No. 135.—This round grave, type-1a burial was 6.3 feet deep in square 100L10. The skull was missing, evidently having been removed before burial. With this burial were a flint point, a string of columella cylindrical shell and jasper beads, and a broken banner stone. This last artifact, shown in the upper left of plate 94, figure 2, had a large section missing. It was made of granite, carefully drilled and highly polished. The two faces were not symmetrical, but each was very carefully worked.

Of the 141 burials, 98 were in such condition that the form of burial could be fairly well determined. They were classified as to type and plotted as to depth with the result shown in the accompanying chart. (See fig. 12.)

An inspection of this chart reveals that the round-grave burial, type 1a, has a maximum occurrence at the bottom of the mound, some burials of this type extending into the yellow sand below the midden. Obviously, this type was one of the earliest in use at this site. The partially flexed burial, type 2a, seems to have been employed at all levels, but to have been concentrated in and about the bottom of zone A, which is just above a water-laid zone of sand (zone B). This lower portion of zone A has been shown to be relatively sterile of certain types of artifacts. The sitting burials, type 5, seem to belong to the lower portion of the midden and to have a maximum in the 5.5-foot level. Twenty-seven of these burials occur below the water-laid sand in zone B. Two burials classified as belonging to this type may be improperly so regarded, since in this type of burial—due to slumping—the position of the body has changed, and one is often compelled to judge of its first position only by observation made on skeletons which have been much shifted.

DOG BURIALS

A fact which has, perhaps, not been given sufficient consideration in shell-mound archeology, is the presence of dog burials. In this site it is evident that dogs were intentionally buried and that as much care was used in their disposition as in cases of human interment. Plate 82, figure 2, shows the skeletons of two dogs in the burial pit of burial No. 77. These dogs were first placed in the pit and the human body placed exactly upon them. A dog buried at a depth of 5.5 feet in zone E is shown in plate 85, figure 1. Here seems to be an intentional disposition of the body. Usually the preservation of dog skeletons in shell mounds is fairly good, probably due to good drainage.

They seem to occur at all depths, but are most numerous in the 5-foot level. Plate 90, figure 1, shows a dog in square 100L10 at the 5.5-foot level, and plate 87, figure 1, shows a dog burial at the 2.4-foot level.

The 20 dog skeletons found in Unit 1 were distributed as to depth as follows:

Depth in feet:	Number of dog (skeletons)	Depth in feet—Continued.	Number of dog (skeletons)
2	1	5	1
2.5	2	5.5	6
3	2	6	1
3.5	0	6.5	0
4	0		
4.5	1	Total	14

Of these 14 burials, 11 were in seeming association with human burials.

ARTIFACTS

From burial association and general digging, 1,413 artifacts were classified as field specimens. These were exclusive of 1,536 potsherds classified and distributed as to depth, and 2,463 flint objects taken from blocks 1, 2, and 3, and 2,151 additional flint artifacts taken from trenches surrounding the three blocks.

LIST OF ARTIFACTS

Bone projectile points	304
Bone awls (splinters)	202
Bone needle awls	67
Bone pins	146
Fish-bone awls	22
Bone fishhooks	7
Bone tubes	6
Bone flakers	7
Bone pendants	6
Bone spatulate fleshers	5
Bone beads	2
Bone gorgets	1
Miscellaneous worked bone	283
Antler tips	150
Antler drifts	48
Antler shaft straighteners	3
Antler reamers	3
Atlatl hook antler	1
Cut antler	30
Shell beads (occurrence)	30
Shell gorgets	2
Crinoid beads	5
Atlatl weights	3
Stone gorgets	11
Limestone celts	5
Tubular pipes and fragments	9
Stone beads (occurrence)	16

List of Artifacts—Continued

Sandstone disk	1
Grooved stone ax	1
Banner stone	1
Steatite vessel	1
Miscellaneous artifacts	35
Total	1, 413

As will appear, bone and antler artifacts were numerous. They appear to be scattered in all levels, and seem to show no significant concentrations or unusual distributions. Interest attaches to the distribution of bone projectile points in an attempt to determine whether or not they displaced or were displaced by flint points at any level. At this site they, as well as flint, seem to have been used in some quantities at all levels.

The distribution of the 294 bone projectile points is shown in the following chart (fig. 13):

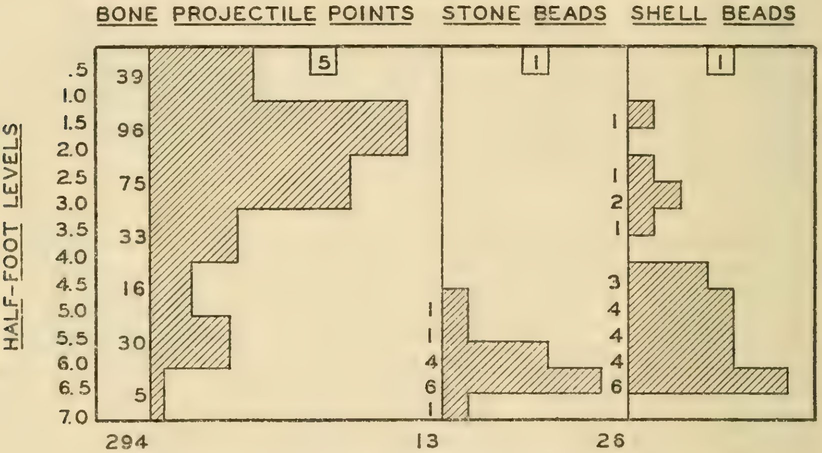


Figure 13.—Depth distribution of type artifacts in site Lu° 25.

From this chart it is apparent that bone projectile points were quite numerous within the upper 2 feet (the pottery zone), and were thus in use toward the close of occupancy of the site. The very few which occur in the lower levels are sufficient to show they were used in the early stages of the midden also. There is no evidence that they were displaced by the use of flint, but rather that as flint came into greater use, the use of these bone projectile points also increased. Many of these points are shown in plate 98, figure 1, lower row. There are also presented typical hairpins of bone, and fishhooks. The fishhooks were of two kinds; those made from large cylindrical bone, and those made from split toe bones of deer.

One of the most interesting associations of bone and antler objects was found with burial No. 92. Plate 97 presents 30 specimens of worked bone and antler. The bone awls and antler spear points are of the usual form, but the number of horn drifts excites interest. They vary greatly in size, many showing battering as if they had been much used. Two cut antlers are so fashioned that they could have been used as very effective hammers in percussion fracture of flint. In plate 97, figure 1, a section of horn has a round hole a half inch in diameter drilled through it. This was probably an arrow shaft-straightener, serving as a wrench in holding and bending the shaft in the process of manufacture. In plate 97, figure 2, are shown two larger antler sections which have been drilled. These holes are elliptical and show that the interior surface and edges of these holes have been smoothed by wear. In plate 97, figure 1, is shown an antler chisel with sharp edge, and a section of cut antler which may be the distal end of an atlatl hook. These associations with burial No. 92 seem to represent a rather complete set of tools for working flint by percussion fracture.

SHELL ARTIFACTS

Some 27 or more burials in Unit 1 had some form of shell artifacts. These are usually of shell beads in necklace form often strung with a few stone beads made of jasper. These stone beads are usually cylindrical in form, but occasionally barrel-shaped. Plates 95 and 96 show a variety of these shell necklaces. In most cases the total quantity of beads in any necklace was much too great to admit of convenient photography, so that only a sample is presented. In plate 95, figure 1, the upper string represents 1,120 beads, all small flat disks probably made from river-mussel shells. This was a portion of the beads with burial No. 134. Plate 95, figure 2, presents a plain shell gorget with 2 small pendants from burial No. 125. The gorget is drilled for suspension by a reentrant hole on the reverse side, so as to show drilling on the face. This figure also shows a small string of jasper beads of variable length but of very exactly the same diameter and size of hole. The columella of marine shells were much used to make long cylindrical beads, and *Anculosa* and *Marginella* were used to sew on fabrics. In plate 96 are shown portions of two strings of dentalium beads from burial associations.

FLINT ARTIFACTS

Flint artifacts were classified according to type forms set up for Pickwick Basin, and tabulated as to type and depth distribution. The source of the material was as follows:

Block No. 1	912
Block No. 2	987
Block No. 3	564
Zero trench	620
From other trenches	1, 531

Since experience has demonstrated that studies on depth distribution are much more accurate when made from data taken by the "block" method rather than by trenching, the conclusions drawn herein are based largely on the distribution of the 2,463 specimens from the three blocks.

It appears that the most numerous types were: Type 23, a crude flint blade, as shown in the lower row of plate 93, figure 2; type 17, a long-stemmed point, as shown in the lower row, plate 92, figure 1; types 6, 8, 16, and 22, all long slender points of which 8 and 16 are shown in the upper row (pl. 92, fig. 1); and types 25 (the point) and 26 (the base) of broken flint blades, probably knives which had usually a square base and a rounded point, and which in breaking, usually broke obliquely.

The plot of the distribution of types of block 1 shows very clearly that there was a 1-foot layer nearly sterile of flint at the bottom of zone A, about 3.5 feet deep. This will be apparent by observing figure 14, a chart showing depth distribution of types 23, 3, 17, 25–26 combined, 6–8–16–22 combined, broken blade points, and finally a total of all flint from this block. While most of the types are nearly equally abundant both above and below this sterile zone, types 25–26 reach a maximum *below* and are almost nonexistant *above* this zone.

Since block No. 2 was immediately south of block No. 1, and the profile of the "0" trench showed no considerable change in the natural zones, it would be expected that depth distribution in block No. 2 would follow somewhat closely that of block No. 1. This seems to be the case; the zones, however, were somewhat thinner and the total depth of midden was only 5.5 feet on the average, as contrasted to a maximum of 7.5 feet from block No. 1. Figure 15 is a chart showing distribution of types 23, 6–8 combined, 25–26 combined, and type 17. As before, the sterile zone is apparent. Types 25–26 are concentrated below this sterile zone, and type 17 definitely above it. Block No. 3, being east of block No. 2, seems to have had a somewhat different history. It is generally less rich in cultural material. This possibly may be explained upon the basis that being nearer the center of the midden, material from this block has been pushed toward the edge and has slipped or been thrown, at time of deposit, outward to enrich the peripheral areas of this midden. Whatever the explanation, in all types of artifacts—bone, stone, flint, and pottery—this block is much less productive of specimens. Figure 14 shows the distribution of a number of types, most of which seem to indicate no selective stratigraphy except types 25–26, which again appear concentrated in the bottom of the block, and type 17, while somewhat distributed, still has a maximum in zone A. These tendencies to stratigraphy which are weaker in block No. 3 to the east of blocks Nos. 1 and 2, are much stronger in the "0" trench to the west of blocks Nos. 1 and 2. A chart (fig. 16) for the "0" trench again shows types 25–26 concentrated at the bottom of the midden and type 17 having a maximum in the top of zone A. It also shows how a sterile zone which has been shown to exist at the 3.5-foot level may be nearly completely obscured by the method of trenching and gathering material in 1-foot levels.

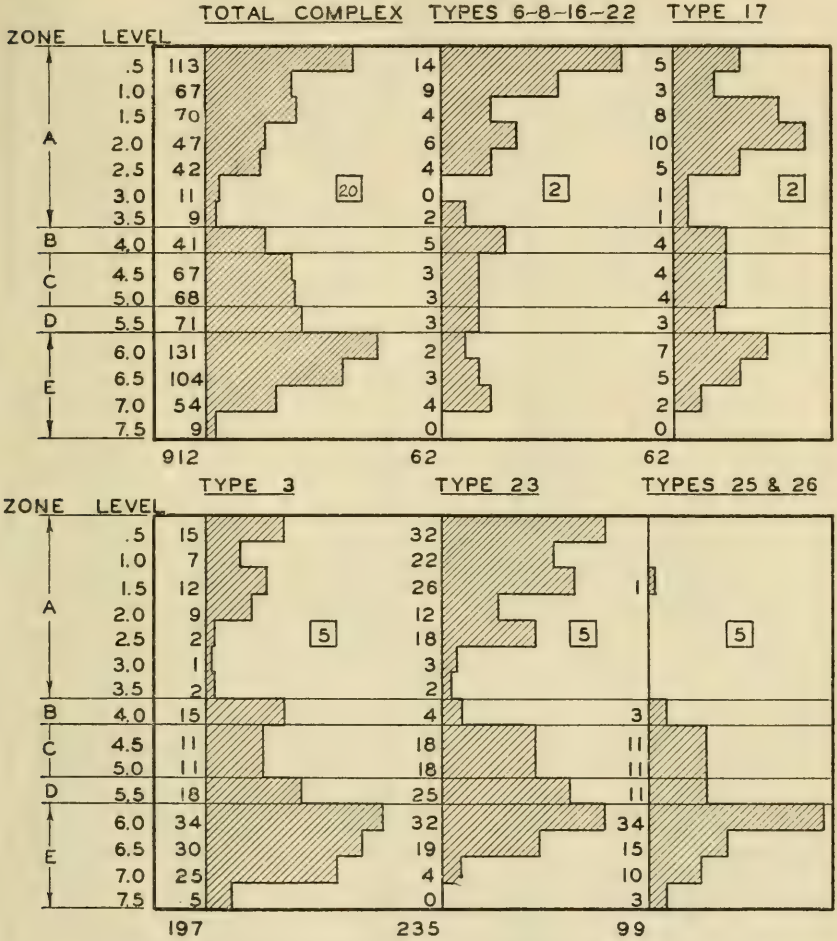


FIGURE 14.—Depth distribution of flint types from block No. 1, site Lu° 25.

Types 3 and 7, which occur in relatively small numbers at this site, are shown in the lower row of plate 93, figure 1.

In plate 101, figure 2, are shown representations of two forms of chipping of flint fairly common at this site, and which indicate a high order of skill in the manufacture of flint blades. One of these types of chipping, which might be likened to that of the Yuma type, throws off a long flake oblique to the blade edge. These flakes usually extend across the blade face, well past the center, to intersect with similar flakes thrown off from the opposite edge. The channels left on the blade are remarkably regular in size and placement, and made possible the production of a very symmetric point. Another type of chipping superposes on top of the primary chipping to form the blade and the secondary chipping to produce a regular edge, a tertiary chipping which removed very small flakes at regular intervals which did *not overlap.* The effect of this chipping was to produce a very uniform and sharp serration of the edge of the blade. Its cutting properties were probably

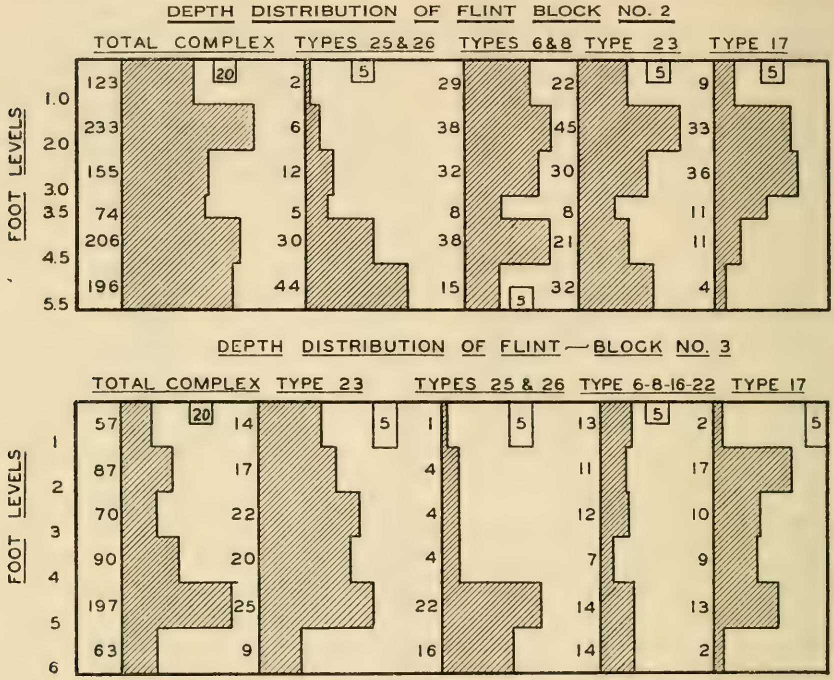


Figure 15.—Depth distribution of flint from blocks Nos. 2 and 3, site Lu° 25.

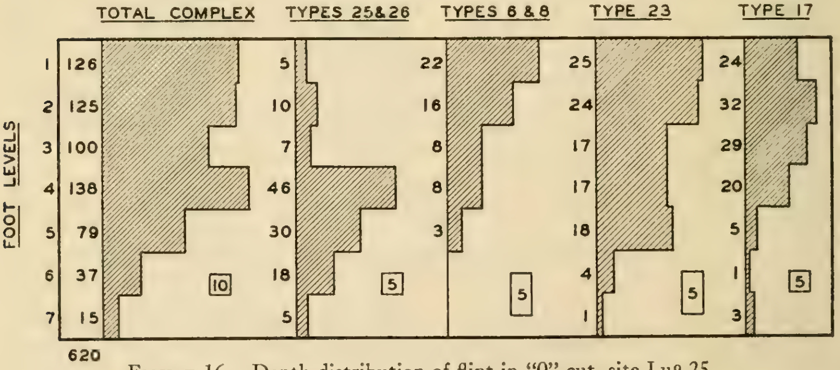


Figure 16.—Depth distribution of flint in "0" cut, site Lu° 25.

thereby much increased. This type of chipping seems to be an extra technique applied to any type of flint point, as desired. Thus, the point of any type may or may not have this additional serration.

These two types of flint chipping are illustrated in plate 101, figure 2. The two points at the left show the very regular tertiary chipping. This technique seems to have started early in this midden and to have been increasingly used in its later stage. It was only sparingly used at any time, so that the total number of points showing this chipping is relatively very small. Only 153 good specimens were found in sorting 4,614 flint objects. The following tabulation shows the depth distribution and how this type increased toward the top of the midden:

Foot level:	*Tertiary chipping*	*Yumalike chipping*
1	44	----
2	33	----
3	11	1
4	26	3
5	26	13
6	9	6
7	4	1
Total	153	24

In sorting 4,614 flint objects, 24 points with Yumalike flaking were found, distributed as to depth as shown in table. Only one was found above zone B. They seem to be concentrated in the 5-foot level, i. e., the top foot of zone E, and are more numerous below than above it. While the number is much too small to draw any certain conclusion, this type seems to represent a technique used in the early stage of the midden which never extended to zone A or to the pottery levels. This type of flaking is shown in the two points on the right of plate 101, figure 2.

In the upper right of the same figure are shown two flint scrapers of unusual form. Each consists of a crude flake with a deep notch chipped in it. The flake is practically unworked except in the notch, which shows much secondary chipping and wear, and some evidence of retouching. These seem to have been scrapers designed to scrape round surfaces, as in the preparation of projectile shafts.

Stone artifacts other than flint were not numerous at this site. The most unusual artifact found at this site, and so far found only once in another shell mound, was the tubular pipe. Three complete pipes and fragments of six others were found in Unit 1.

These three perfect specimens are shown in plate 94, figure 1. From left to right they were taken from Burials Nos. 84, 4, and 58. All these were type-2a burials at depths of 2, 3, and 3.5 feet, respectively. All pipes and pipe fragments were taken from zone A.

The pipe on the left is 6.25 inches long by 2.25 inches in maximum diameter. The inside bowl diameter is 1.9 inches. The pipe is definitely restricted at the mouth end, and the edge of the bowl has two concentric circles carved in the face of the edge.

The central specimen shown in plate 94, figure 1, is 9 inches long and 2.5 inches in maximum diameter. It is made of a sandy, green shale which shows banding very slightly. The pipe on the right is 6.5 inches long and 2.5 inches in maximum diameter. The mouth end is quite constricted, and the hole in the mouth end is 0.6 of an inch in diameter. On the outside, both about the bowl and the mouth end, there is a band of incised chevron decoration.

Plate 94, figure 2, presents a number of fragments of pipes, two-holed slate gorgets, and banner stones. The central rectanguloid gorget is made of white limestone, which is a fine-grained marble. It is highly polished and drilled with two holes, reamed from both sides. It is 4.75 inches long by 3.25 inches broad in maximum dimensions. There are four other fragments of two-holed gorgets. These suggest the expanded-bar type, but are not well made and quite thin. In the upper left-hand corner of this figure is presented a large fragment of a banner stone made of granite, its maximum length is 4.5 inches and width 3.25 inches. It is essentially a flat plate with rounded corners and a raised ridge extending transversely across the center of this plate. This expanded portion is bored longitudinally with a hole 0.5 of an inch in diameter. The break appears old and the broken fragment was missing. It was not found within the grave and could hardly have escaped detection if it had been included in the burial. In the lower row on the right are shown one complete banner stone and fragments of two others. These so-called banner stones, or net spacers, are preferably termed atlatl weights. The perfect specimen in the lower right is 2.75 inches by 3 inches. The fragment has a triangular cross section formed by one plane face extending its entire width, and the other face composed of two intersecting planes. It is made of an ore of iron, probably iron carbonate originally, which has weathered. The fragment of a similar stone adjacent to it on the left, also is encrusted with a thick coat, the result of weathering. This coat is very brittle and readily scales off. A third stone of this type, broken in half and made of limestone, was found in the general digging. These are regarded as possible atlatl weights, and two of them may have been ceremonially broken, although they were not found in burial association.

One of the most interesting stone artifacts from this site is the large steatite vessel shown partially restored in plate 98, figure 2. This vessel had been broken into large sherds and used to cover burial No. 90, as shown in plate 84, figure 2. Not all of the vessel was recoverable, and restoration was therefore incomplete. The vessel was far from circular at the rim, and the curvature was quite irregular. The inside diameter was about 11.5 inches and the outside maximum diameter was 13.5 inches. The vessel was 8.25 inches deep, with an average wall thickness of 0.75 inch. The vessel had been made by cutting it out with a chisel, the marks still remaining on the outer surface. The interior surface had been ground down so that the chisel marks were almost invisible. The bottom edge of these large sherds seem to have been damaged, possibly by heat. These sherds crumbled badly on the lower edges, which probably accounts for the loss of the bottom section of the vessel. It is hardly to be supposed that the makers and users of this bowl would have put it into the fire, since they must have known that it would have cracked under the effect of heat; if, however, hot pebbles had been used to heat water in such a vessel, they could have caused the disintegration of the material in the bottom of the vessel, as observed.

POTTERY

There were no complete pottery vessels found at this site and no large sherds. None were found in any certain burial association. The pottery at this site consisted of sherds, representing all five wares common to Pickwick Basin. All sherds are concentrated in the upper portion of zone A, in a layer about 2 feet thick. These sherds were classified as to temper and tabulated as to depth by foot levels, as shown in the following pottery distribution table (table 4):

TABLE 4.—*Depth distribution of potsherds by temper types and materials*

BLOCK No. 1, 30 BY 30 FEET—36 SQUARES

Foot level	Temper type						Wattle	Sandstone
	Fiber	Sand	Limestone	Clay-grit	Shell	Total		
1	100	38	13	6	6	163	1	1
2	2		1	1		4		
Total	102	38	14	7	6	167	1	1

BLOCK No. 2, 30 BY 35 FEET, LESS ONE SQUARE— 41 SQUARES

Foot level	Fiber	Sand	Limestone	Clay-grit	Shell	Total	Wattle	Sandstone
1	92	33	95	1	27	248	3	1
2	70	39	53	2	12	176	1	2
3	1		2			3		6
Total	163	72	150	3	39	427	4	9

BLOCK No. 3, 30 BY 30 FEET—36 SQUARES

Foot level	Fiber	Sand	Limestone	Clay-grit	Shell	Total	Wattle	Sandstone
1	21	9	19	7	4	60	1	
2	17		1		1	19		
3		1				1		
4	1					1	3	
Total	39	10	20	7	5	81	4	

TABLE 4.—*Depth distribution of potsherds by temper types and materials*—Continued

TRENCHES ABOUT BLOCK No. 1, L8 (50-80), L1, AND 45-FOOT CUTS—38 SQUARES

Foot level	Temper type						Wattle	Sand-stone
	Fiber	Sand	Lime-stone	Clay-grit	Shell	Total		
1	106	39	14	1		160		1
2	10	4	2	2		18		1
3		1				1		
4			2	1		3		
Total	116	44	18	4		182		2

TRENCHES ABOUT BLOCK No. 2, 80-FOOT CUT (L1-L8), L8 (85-115-FOOT CUT), AND 115-FOOT CUT (L1-L8)—20 SQUARES

1	20	16	49			85	2	
2	38	8	19			65	2	1
3	3	5	7	1		16		
4	5	3	1			9		
Total	66	32	76	1		175	4	1

TRENCHES ABOUT BLOCK No. 3, 115-FOOT CUT (L9-L15), 80-FOOT CUT (L9-L15), AND L15 CUT—20 SQUARES

1	13	2	11	1	5	32		
2	9	4	3	0	1	17	1	1
3	3	1			1	5		
4			1			1		
Total	25	7	15	1	7	55	1	1
Grand total	511	203	293	23	57	1,087	14	14
Percent	47	18.7	27	2.1	5.2	100		

It will be observed that blocks Nos. 1, 2, and 3 yielded 675 sherds as the result of excavating 113 5-foot squares, and only 5 sherds appeared below the 2-foot level. These sherds obviously may belong to the levels in which found, but it is conceivable that these 5 sherds—less than 1 percent of the total—may have been brought to a lower depth than 2 feet by accident in aboriginal digging of pits for fire basins or burials, or perchance by error in obtaining records in the long process of excavation—washing, classifying, etc.—through which potsherds must go to be counted. In this excavation the trenches about these blocks were dug as carefully as the blocks themselves, but obviously, by the "trenching" method. These trenches represented an excavated area of 78 5-foot squares and yielded 412 sherds. This shows the number of sherds recovered to be about proportional to the area, i. e., that distribution of sherds was fairly uniform, yet there were 35 sherds found below the 2-foot level. Obviously, one cannot positively affirm that these 35 sherds were out of place, and for so large a number, it would require a multiplicity of accidents to account for all of them, if, indeed, the pottery zone is actually only 2 feet thick. But the point here to be illustrated is that *always* data on artifact distributions taken by the block method "cuts off" at the bottom of a cultural zone more abruptly than data taken by the trench method, even when, as in this case, areas excavated were as nearly comparable as it is possible to make them. That is to say, the block method seems to be able to distinguish stratigraphy as marked by the bottom of cultural zones more exactly than the trench method is able to do.

Thus, it appears that the pottery is practically all confined to the top 2 feet of this midden with two-thirds of the total number of sherds in the upper 1-foot level. This fact may explain why block No. 3 yielded somewhat less pottery. In the process of building on this shell mound, a portion of the original surface may have been removed, thus reducing the pottery count.

While all five wares are found on this site, shell temper (type 5) is relatively unimportant, being less than 3 percent of the total. Fiber-temper (type 1) ware is the most numerous and also carries larger values to greater depth in the sherds from the blocks. This would seem to point to fiber-tempered pottery being the earliest to appear at this site, a fact well demonstrated for other reasons and at other sites in the Basin. Limestone temper is second in relative importance and sand-tempered ware is third in occurrence. The table shows the percentage of each.

The types of decoration accompanying these tempers are shown in plates 99 and 100.

The fiber-tempered sherds from this site show a very considerable number of rim sherds to have been drilled about an inch below the rim. This sometimes occurs in sand-tempered ware, as shown in plate 99, figure 2, and plate 100.

Beside pottery vessels made from clay, vessels were cut from steatite, as described above, and also from sandstone. Plate 99, figure 2, lower right, shows a number of sandstone sherds found in the general digging. These are found sparingly at depths within and also below the pottery zone. It would seem certain that a few vessels of sandstone and steatite were in use at this site long before pottery was known or used on this midden. In table 5 the data from blocks Nos. 1 and 2, and the "0" trench have been combined to obtain a distribution of 1,044 sherds.

TABLE 5.—*Distribution of sherds from blocks Nos. 1 and 2 and trench "0" cut by type and subtypes* [1]

Type No.	Temper	Subtypes									Total
		a	b	c	d	e	f	g	h	i	
1	Fiber	140	102	114	10	32	----	----	----	----	398
2	Clay-grit	62	101	8	----	3	29	5	1	1	210
3	Limestone	127	205	1	2	1	----	----	----	----	336
4	Sand	29	3	2	----	1	----	----	----	2	37
5	Shell	62	------	----	----	1	----	----	----	----	63
Total		------	------	----	----	----	----	----	----	----	1,044

[1] For explanation of subtype symbols, see table 1, p. 525, in section on Pickwick pottery, by William G. Haag.

GENERALIZED PROFILE

In figure 17 there is presented a generalized profile for Unit 1 of this site. It is an attempt to integrate the total information from this site, and thus to represent average conditions over Unit 1 of the mound.

It appears that the pottery zone is about 2 feet thick. The extended burials all occur in this zone or are intruded from it. Within the 5-foot level a shop site at one time existed, accounting for development of characteristic flint types. Sitting-posture burials are definitely below the pottery zone. Flint artifacts extend to the bottom of the midden and bone projectile points extend throughout, but have a maximum in the 2-foot level. Type-1a burials are concentrated in the 7-foot level and extend into the sand-clay zone below the midden.

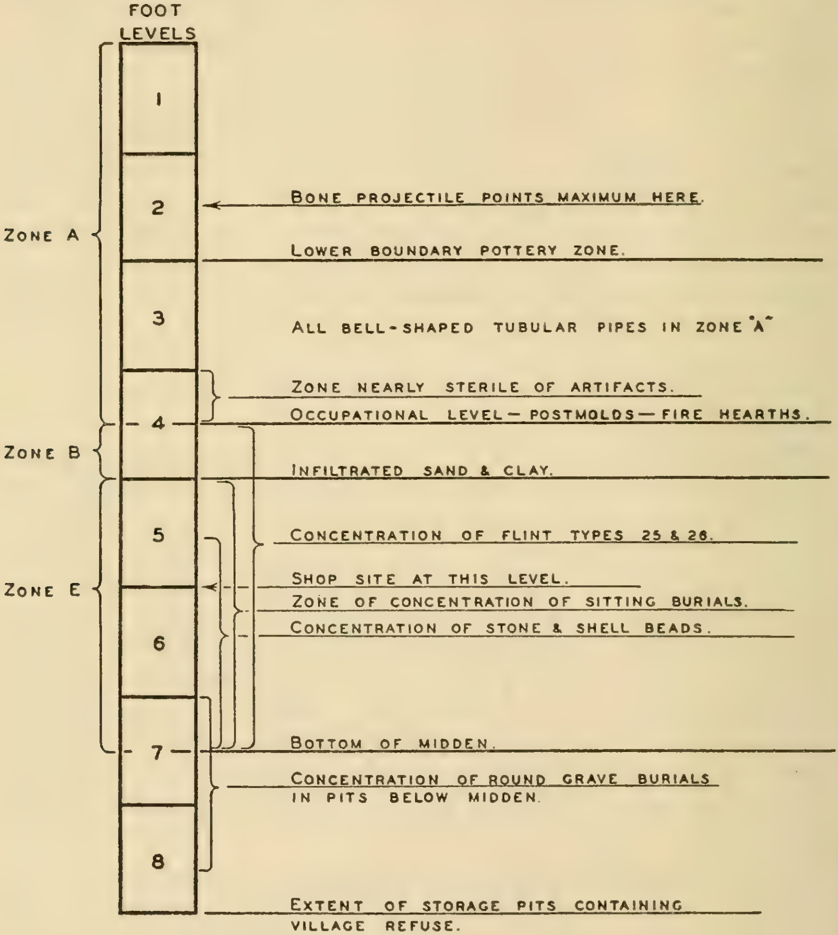

FOOT LEVELS
1
2
3
4
5
6
7
8
ZONE A
ZONE B
ZONE E
BONE PROJECTILE POINTS MAXIMUM HERE.
LOWER BOUNDARY POTTERY ZONE.
ALL BELL-SHAPED TUBULAR PIPES IN ZONE "A"
ZONE NEARLY STERILE OF ARTIFACTS.
OCCUPATIONAL LEVEL — POSTMOLDS — FIRE HEARTHS.
INFILTRATED SAND & CLAY.
CONCENTRATION OF FLINT TYPES 25 & 26.
SHOP SITE AT THIS LEVEL.
ZONE OF CONCENTRATION OF SITTING BURIALS.
CONCENTRATION OF STONE & SHELL BEADS.
BOTTOM OF MIDDEN.
CONCENTRATION OF ROUND GRAVE BURIALS IN PITS BELOW MIDDEN.
EXTENT OF STORAGE PITS CONTAINING VILLAGE REFUSE.

FIGURE 17.—Generalized profile, site Lu° 25, Unit 1.

PERRY SITE, LU ° 25, UNIT 2

As explained in the report on Lu° 25, Unit 1, it was found convenient to excavate this site as two separate units. Figure 9, Unit 1, shows a ground plan of the excavation of the whole site. Blocks Nos. 1, 2, and 3 with the trenches about them constituted Unit 1. Blocks Nos. 4, 5, and 7, which were exploited by extension of trench L115, and block No. 6 constituted Unit 2. The natural zones in Unit 2 seemed comparable to those in Unit 1. Profiles of blocks 4, 5, 6, and 7 are shown in figure 18 and the 115-foot profile, the 80-foot profile, and L37-foot profile are shown in figure 19. The natural zones retain the same designations as in Unit 1.

Plate 103, figure 2, shows an extension of the 115-foot trench and the outline of block No. 4. This view is taken looking toward the old excavation of Unit 1. The completion of block No. 6 is shown in plate 103, figure 1. The burials exposed were on or in the silt zone under the shell. The half of a midden pit shown in the right foreground is the other half of the pit shown in plate 104, figure 2.

Unit 2 was quite similar, in many ways, to Unit 1, but in other ways quite different in that superficial multiple burials were found in Unit 2. These were very infrequent in Unit 1, which illustrates the fact that any sample of an archeological site, unless it is complete, may still be inadequate in providing a true picture of its history. Certainly Unit 1, extensive as it was and very valuable in itself, did not tell the whole story of this occupancy.

As extensive as the excavations at Unit 2 have been, its possibilities for yielding additional information were by no means exhausted. Work was discontinued, however, in favor of a site upon which no work had been done since the new site was on the mainland and did not require crossing the river. In winter time the river surface is often very rough as the result of high winds, and the transport of working crews in open boats is not only difficult, but is attended by somewhat more danger than in the summer season. Partly as a safety measure and partly from a desire to extend the investigation to a new site, the work was discontinued after 5-foot blocks of Unit 2 had been investigated. The condition of this site at the close of work is shown in plate 117.

FEATURES

This unit produced 50 additional special features which may be classified as follows:

Kitchen midden pits in subsoil	13
Fired clay hearths	11
Fire pits floored with stone	13
Cache of river pebbles used as hammerstones	1
Cache of sandstone rocks	9
Clam-bake pits	2
Scattered post-mold areas	1
Total	50

These features, perhaps, do not require special description. In type they are quite similar to those found in Unit 1.

Feature No. 60, a typical cache of sandstone water-worn pebbles used as hammerstones, is shown in plate 116, figure 2.

BURIALS

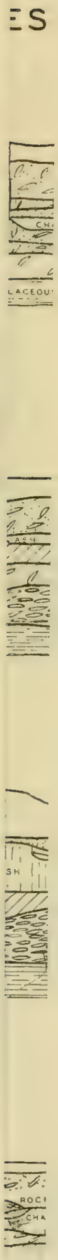
Unit 2 yielded 209 additional burials from the site. The outstanding difference between this unit and Unit 1 is the fact that Unit 1 yielded few intrusive burials except those clearly belonging to the shell-mound complex as found on other shell middens in the Basin. However, Unit 2 showed abundant evidence of a later occupancy by a people burying their dead in extended graves, often in multiple burials, with many artifacts in the graves, especially pottery. Plate 104, figure 1, which presents an extension of the 115-foot trench, shows this type of intrusive burial. Of the 209 burials in this unit it was possible to recognize 41 of these as intrusive, and because they were so similar to burials found on Koger's Island, they were tentatively designated the Moundville complex. These burials were often multiple burials, and because they were intrusive they often cut into burials of their own people, or into those of the earlier Shell Mound folk, resulting in considerable disturbance of burials. Since this complex is so distinct and easily separable from the shell-mound complex, these burials have been tabulated separately. The multiplicity of burials is shown in the following table:

Skeletons per grave	*Number of occurrences*	*Total*
6	1	6
5	1	5
4	3	12
3	3	9
2	1	2
1	7	7
Total		41

Thus, in 16 graves there were 41 individuals buried. The distribution of burial types is as follows:

Extended type 3a	10
Partially flexed type 2a	17
Infants	4
Disturbed	4
Bundle burial of bones	3
Single detached skulls	3
Total	41

The average depth of these intrusions was 2.1 feet, and few were as deep as 3.5 feet. The wealth of artifacts with these burials is in strong contrast to the lack of grave furniture in the remaining 168


ES
CH
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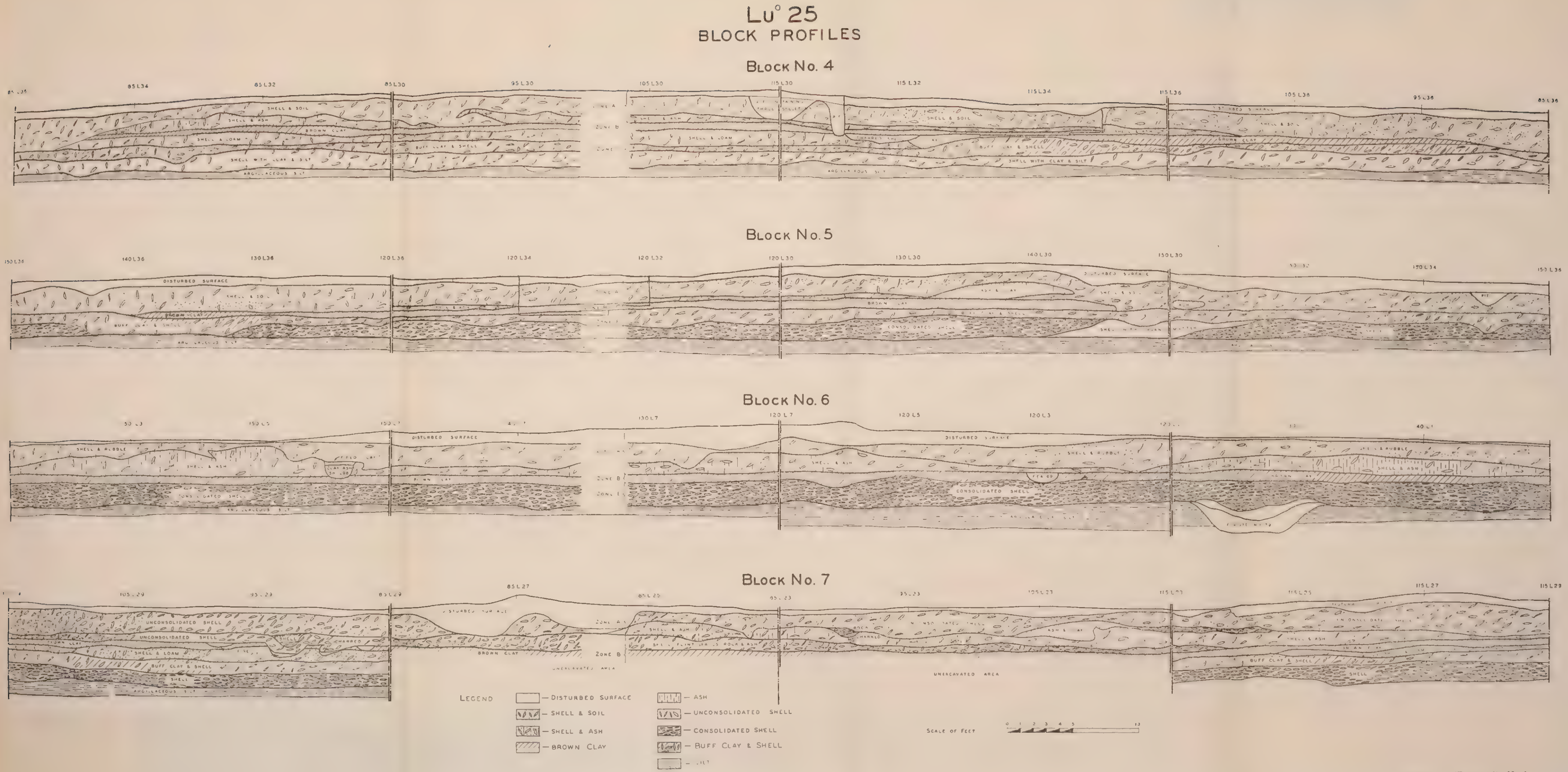
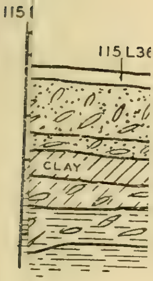
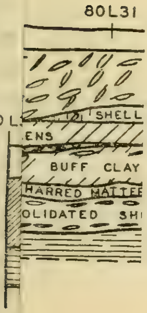


Lu° 25
BLOCK PROFILES
Block No. 4
Block No. 5
Block No. 6
Block No. 7
Shell & Soil
Shell & Ash
Brown Clay
Shell & Loam
Shell with Clay & Silt
Argillaceous Silt
Buff Clay & Shell
Zone A
Zone B
Disturbed Surface
Consolidated Shell
Shell & Rubble
Unconsolidated Shell
Unexcavated Area
Legend
— Disturbed Surface
— Shell & Soil
— Shell & Ash
— Brown Clay
— Ash
— Unconsolidated Shell
— Consolidated Shell
— Buff Clay & Shell
— Silt
Scale of Feet
0 1 2 3 4 5 10

Figure 18.


115
115 L36
CLAY


80L31
40 L
SHELL
ENS
BUFF CLAY
HARRED MATTER
OLIDATED SH

Lu° 25
TRENCH PROFILES

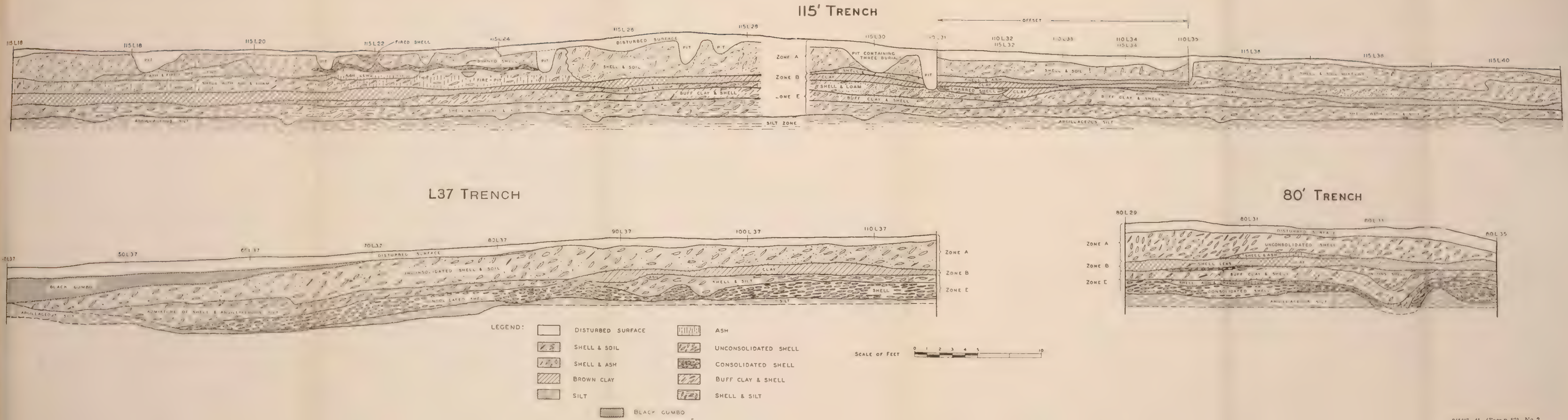

115′ Trench
OFFSET
115L16
115L18
115L20
115L22
FIRED SHELL
115L24
115L26
DISTURBED SURFACE
115L28
PIT
PIT
PIT
PT
BURNED SHELL
ASH & FIRED SHELL
ASH LENS
SHELL WITH ASH & LOAM
FIRE-PIT
SHELL & SOIL
SHELL & LOAM
BUFF CLAY & SHELL
SHELL WITH CLAY
ARGILLACEOUS SILT
SILT ZONE
ZONE A
ZONE B
ZONE E
115L30
PIT CONTAINING THREE BURIALS
110L31
110L32
115L32
110L33
110L34
115L34
110L35
115L36
115L38
115L40
CLAY
SHELL
ASH
SHELL & LOAM
BUFF CLAY & SHELL
CHARRED SHELL
CLAY
SHELL & ASH
SHELL & SOIL
SHELL & SOIL MIXTURE
BUFF CLAY & SHELL
ARGILLACEOUS SILT
SILT WITH CLAY
L37 Trench
40L37
50L37
60L37
70L37
80L37
90L37
100L37
110L37
DISTURBED SURFACE
BLACK GUMBO
UNCONSOLIDATED SHELL & SOIL
CLAY
ASH
SHELL & SILT
SHELL
CONSOLIDATED SHELL
SILT
ADMIXTURE OF SHELL & ARGILLACEOUS SILT
ARGILLACEOUS SILT
ZONE A
ZONE B
ZONE E
80′ Trench
80L29
80L31
80L33
80L35
DISTURBED SURFACE
UNCONSOLIDATED SHELL
SHELL & ASH
SHELL LENS
CLAY
BUFF CLAY & SHELL
SHELL
CONSOLIDATED SHELL
ARGILLACEOUS SILT
ZONE A
ZONE B
ZONE E
LEGEND:
DISTURBED SURFACE
SHELL & SOIL
SHELL & ASH
BROWN CLAY
SILT
ASH
UNCONSOLIDATED SHELL
CONSOLIDATED SHELL
BUFF CLAY & SHELL
SHELL & SILT
BLACK GUMBO
SCALE OF FEET
0
1
2
3
4
5
10

Figure 19.

graves of the shell-mound complex. These graves as a rule have no "burial offerings" in the graves of adults. Shell and stone beads, bone clothespins, and articles of dress or ornament may be included, though they are rare in adult graves. Of the shell-mound complex only 43 graves had any artifacts of any kind in them. Of these, 17 had flint projectile points, many of which may have been only chance inclusions in the grave fill. Thirteen burials had shell beads and seven had bone awls or pins. Only 6 graves out of 168 had artifacts other than those just mentioned.

The classification of these 168 graves is shown in the following table:

Round grave, type 1a	35
Round grave, type 1b	9
Round grave, type 1c	1
Partially flexed, type 2a	27
Partially flexed, type 2b	2
Partially flexed, type 2c	1
Extended burial, type 3a	6
Extended burial, type 3b	3
Sitting burial	11
Disarticulated burials	2
Infants	44
Disturbed burials	27
Total	168

The continued use of a midden area as an occupational site, and the custom of burial of the dead in the same midden in unmarked graves leads, as a matter of course, to much disturbance of burials by aboriginal digging. While this is to be expected and is often to be observed in any site, it can hardly explain all of the unusual forms of burials to be observed. It seems to have been not uncommon to decapitate the dead before burial. Of these 168 burials reported from the shell-mound complex of this Unit, 16 were found headless. Of this number, only 4 were classed as "disturbed." That is, only 4 of the headless burials show unmistakable evidence of postburial disturbance by later digging. The strong inference is that the heads were removed prior to, or at burial, and were never put in the graves. Four single heads were found in the midden, 3 of which were in graves of the Koger's Island complex leaving only 1 as an offset against the 9 burials lacking skulls. One wonders what caused this discrepancy and what disposition was made of the heads. Perhaps one suggestion may be valid—that they were used to manufacture artifacts of bone. This possibility rests on the fact that occasionally artifacts made from human shulls have been found in shell mounds. Plate 298, figure 1, Ct° 27, shows a cup made from a human skull. Stirling (1935, p. 376) reports a cup made from a human skull from the Belle Glade Site in

Florida. In any case, the number of missing skulls seems somewhat greater at this site than at the other shell middens.

Excavation of Unit 2 produced 16 dog burials, some in seeming association with human graves and others clearly not so associated. Some dog skeletons were fragmentary, that is, probably had been disturbed.

Except for the intrusive group of 41 burials, there seems no significance to the depth distribution of burial forms in this unit. Many of the round-grave pit burials with shell and stone beads occur in the sand-clay layer just under the shell, but they are also to be found at other levels. The sitting burials are mostly in zone B, or below, yet they, too, are found at different levels.

The depth distribution of burial types is shown in the following chart (fig. 20) for the 95 burials of determinable form and the 41 burials belonging to the Moundville complex. While it is difficult to draw any exact conclusions as to stratigraphy of burial types, yet an inspection of this chart will show that the shell-tempered pottery people, the Moundville complex, lay entirely within the pottery zone. It is equally manifest that the type-5 sitting burial belongs to the non-pottery period of the midden. It is quite apparent that the partially flexed types 2a, 2b, and 2c lie almost exclusively in the pottery zone. The same is true of type-1b round-grave burial placed on the back. It is likewise apparent that the true round-grave type 1a is the earliest type to be used in quantity and persisted at a rather uniform rate to the very latest period of the midden building.

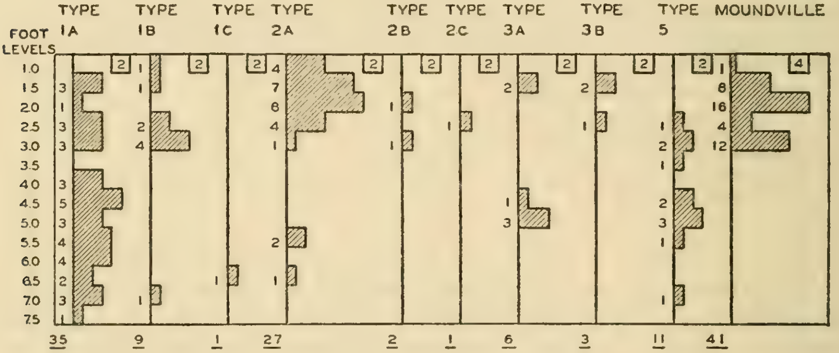


FIGURE 20.—Burial depth distribution by types in site Lu° 25, Unit 2.

It is not possible to describe every individual burial having artifacts, but there follows descriptions of those single burials and groups which seem significant and for which illustrations were selected. This represents but a small part of the total, but is believed adequate to give a fairly accurate picture of conditions at Unit 2. Burials numbered 1 to 141 inclusive were considered in Unit 1. Burials in Unit 2 were numbered 142 to 350 inclusive.

Burials Listed for Special Description

Burials Nos. 145, 146, and 147.—This multiple burial was at a depth of 2.1 feet in square 115L32. No. 145, a partially flexed adult, was laid over No. 146 also partially flexed. Burial No. 147, a reburial of bones (skulls missing), was carefully piled on top of No. 146 and covered by No. 145. Plate 106, figure 1, shows this burial, and plate 106, figure 2, presents it after burial No. 145 was removed. At the head of this burial there was a large pot with four strap handles, a small pot with four strap handles containing three shell spoons, two large pot sherds nestled in each other, a large open bowl, and a bone awl. Two of these vessels are shown in plate 118, figure 1.

Burial No. 158.—This partially flexed burial was in square 115L35 at a depth of 2 feet. At the head was a large sherd of a small shell-tempered, plain pot, and a large-mouthed plain water bottle, both shown in plate 118, figure 2. Also a very fine specimen of black water bottle engraved with eagle design was near the head, and a large pot, a utility vessel, badly crushed was found by the side of the body as shown in plate 104, figure 2. Two views of this water bottle, together with a drawing reproduction of the engraved figure of the eagle, are shown in plate 119.

Burials Nos. 161, 162, 163, and 225.—This multiple burial was made by the burial of No. 163 as a partially flexed burial at the foot of which No. 162 was placed as a reburial of bones in disarray piled over the skull as shown in plate 105, figure 1. Burial No. 161, a fully extended burial, was then placed on top. This skeleton had a pathological tibia of the right leg. At the head of burial 163 was a two-strap handle pot and a water bottle as shown in plate 118, figure 3. On a chest was a shell gorget engraved with a cross and two shell pins. Such pins have often been called "ear pins." Plate 105, figure 2, shows the position of these shell pins in situ which seems to suggest that they were hairpins rather than ear ornaments. These shell pins, together with nine large shell beads from conch columella, are shown in plate 120, figure 1. Under the knees was found the skeleton of a fetus, burial No. 225.

Burials Nos. 164, 165, 166, 167, and 224.—This burial consisted of four headless, partially flexed adult skeletons in square 120L37 at a depth of 1.8 feet. (See pl. 107, fig. 1.) One ramus was present. Under the pelvis of No. 165, which was buried face down, was a skeleton of a fetus, No. 224. There were no artifacts in the grave.

Burials Nos. 169, 170, and 171.—Burials 170 and 171 were two typical round-grave burials, type 1b, close together in squares 115L19 at a depth of 2.8 feet. They were headless. No. 170 had three bone awls at the side. These are shown in plate 108, figure 1. Burial No. 170 had a pathological vertebra as shown in plate 108, figure 2. Directly on the top of these burials, No. 169, a partially flexed type-2a burial, was laid down as shown in plate 107, figure 2. With this burial was a pot shown on left in plate 121, figure 1, a badly cracked sherd of a very large utility vessel, and two projectile points.

Burial No. 174.—This burial, shown in plate 114, figure 1, was a type-3b extended burial in square 120L29 at a depth of 1.5 feet. It was notable in that it had accompanying it two very long bone awls as shown in plate 121, figure 2.

Burial No. 177.—This was a separate skull at a depth of 2.5 feet in square 120L32. It is possible that this skull belongs to burial No. 127 of which the skull was missing.

Burials Nos. 178, 179, 180, and 188.—This multiple burial was in square 125L38. Burial No. 188, shown in plate 113, figure 2, was evidently made at a depth of 3 feet or more, at the head of which was placed a large pot and a small pot. These are shown in plate 121, figure 3. Later a burial pit was intruded into this grave and the skeleton of burial No. 188 was removed all but the head. Into this grave pit a flexed burial, No. 180, was made, at the feet of which was deposited a pile of human bones, probably those removed by disturbance of burial No. 188. This reburial of bones, designated No. 179, was a complete skeleton except the skull and vertebrae. These were found and designated No. 188. Later, burial No. 178, a type-2b burial, was placed in this pit at a depth of 2.5 feet. With this last burial were placed several stone celts and a pile of triangular flint points at the head. This burial is shown in plate 113, figure 1, and the artifacts are shown in plate 113, figure 2.

Burial No. 190.—This burial was a typical round-grave burial in pit, type 1a. It was 4 feet deep in square 120L45. The skeleton was headless and it had a flint projectile point imbedded in the 12th thoracic vertebra, as shown in plate 112, figure 2.

Burials Nos. 206, 207, 208, and 209.—This group burial was made at a depth of 2.8 feet in square 95L36. It was notable in the fact that of the four skeletons no two were buried alike. Burial No. 206 was a partially flexed burial, type 2b, and burial No. 207 was a flexed 1b type of burial. Burial No. 208 was indeterminate as to form, and burial No. 209, a juvenile, was a 5a type of burial.

In none of these burials was the skull in anatomical position. It appears that all heads had been disarticulated at burial and one skull had been removed. This very entangled burial is shown in plate 112, figure 1. Near burial No. 206 were three flaked flint points, and near burial No. 207 was a flint knife.

Burial No. 237.—This was a partly cremated skeleton of an infant at a depth of 2.4 feet in square 100L35. A large inverted conch shell concealed a portion of the burial and partly covered several unworked columellae of conch shells. With this burial were small disk shell beads and the carapace of a terrapin. These shells were not burned.

Burial No. 279.—This burial was indicated by the deposit of a partially cremated infant partially covered by a conch-shell cup as shown in plate 114, figure 2. This burial was in the pottery zone in square 130L33 at a depth of 1.8 feet and deemed to be associated with the the Moundville complex. Other artifacts and four large collumellae with this burial are shown in plate 124, figure 1.

Burials Nos. 243, 244, 245, 246, 247, and 248.—This group burial was constituted as shown in plate 110, figure 1. Two extended skeletons, Nos. 243 and 244, lay side by side in square 105L33 at a depth of 3.2 feet. A post mold, the result of a recent barn construction on the site, had penetrated this grave and cut off both legs of No. 244 and the right leg of No. 243. At their feet there was an open bowl and several celts and chisels. At the head of this grave was placed a bundle burial, No. 247, completely dismembered and placed in an orderly pile. With this were three extra skulls, Nos. 245, 246, and 248. There were two pots, a water bottle, several large sherds of very large vessels, and a large lap stone. This lap stone covered a cache of chisels and celts. The total number of field specimens was twenty, many of which are shown in plate 124, figure 2. The water bottle, shown in plate 122, figure 2, has an engraved, hard black surface, typical of Moundville. One pot and the open bowl from this group burial are shown in plate 123, figure 1.

Burial 284.—This is a type-3b burial extended to the knees, at a depth of 2.1 feet in square 140L35 as shown in plate 110, figure 2. It is interesting because of the two-strap handled pot at the head of the grave and the pottery ladle, as shown in plate 123, figure 2.

Burial 296.—This is a type-5a sitting burial in square 150L4 at a depth of 4.5 feet. It is shown in plate 115, figure 1. It is especially interesting because of the ridges on each side of the skull. It is more clearly shown in a close-up (pl. 115, fig. 2).

Burial No. 305.—This extended burial was buried face down in square 135L6 at depth of 5.2 feet. The feet were entirely missing. With this burial were shell beads and a fragment of a flint celt.

Burial No. 312.—This is a typical round-grave pit burial, type 1b, at base of mound at depth of 7 feet, in square 125L6. Such burials usually have both stone and shell beads, as shown in plate 116, figure 1.

Burials Nos. 324, 325, 326, 327, and 328.—These five skeletons in square 80L24 constituted two composite burials, as shown in plate 111, figure 1. Burial No. 324, a partially flexed burial, shown on the right of the picture, has an infant burial, No. 325, behind the knees. The other burial containing burial No. 326, type 3a, extended; No. 327, partially flexed, type 2a; and No. 328, type 3a, extended, was intrusive to the first. This composite burial is shown in plate 109, figure 1.

At the head of this burial was an open bowl and a hugh potsherd badly broken. After burial a fire had been built above these bodies so close that the pelvis of burial No. 326 and the left half of the pelvis of burial No. 327 were completely cremated and, as a result, were darkened and badly cracked. This condition is well shown in plate 109, figure 2, which shows a close-up of the area under this fire.

Burials Nos. 342 and 343.—These two extended burials in square 90L6 at a depth of 2 feet are shown in plate 111, figure 2. At the head of the grave was a pot with four strap handles, a small pot with two handles, a sherd of a large vessel, and an open bowl. With burial No. 342 were two shell hairpins. The feet of No. 343 were found, as shown in plate 111, figure 2, deposited in anatomical order just below the pelvis. They were evidently disarticulated at time of burial. Two of these pots are shown in plate 123, figure 3.

ARTIFACTS

Aside from the burial associations with the Moundville Complex, the artifacts of Unit 2 were quite similar to those of Unit 1.

A list of field specimens from the unit follows:

Whetstones	4
Hematite plummets	1
Flint points	58
Stone celts, granite	15
Stone gorgets	3
Slate gorgets	4
Greenstone celts	7
Stone beads	2
Limestone discoidals	3
Terrapin shells	6
Bone awls	253
Bone needle awls	115
Worked-bone fragments	97
Fish hooks	8
Bone ornaments	2
Bone hairpins	6
Fish-spine awls	15
Bone flakers	12
Bone projectile points	130
Antler projectile points	11
Antler tips	115
Atlatls	1
Antler drifts	35
Shell gorgets	4
Shell beads, occurrences	22
Conch-shell ornaments	11
Shell spoons	3
Whole pots	26
Large potsherds	35
Miscellaneous	50

Beyond the recognition of a pottery zone about 3 feet deep, it was not possible to observe any important stratigraphy of artifacts in Unit 2. Flint distribution studies were made, which revealed a considerable use of flint in types common to Unit 1, but no significant depth distribution of flint types was found in any block in Unit 2, although it was carefully sought. It appears from table 6 that in the case of bone artifacts, the bone projectile was much more abundant in the pottery zone and that shell gorgets as well as antler projectile points belong to that level.

TABLE 6.—*Distribution of bone artifacts in site Lu° 25, Unit 2*

Depth (feet)	Bone artifacts			
	Shell gorgets	Bone awls	Antler projectile points	Bone projectile points
1	1	11		12
1.5		11		12
2	2	44	7	40
2.5		18	2	22
3	1	52		14
3.5		23	2	9
4		27		5
4.5		9		2
5		19		8
5.6		12		
6		4		2
6.5		6		4
Unrecorded		17		
Total	4	253	11	130

POTTERY

In the general excavations of Unit 2 all five of the pottery wares common to shell mounds were found as in Unit 1. This difference, however, is very obvious. Whereas in Unit 1, type 5, shell-tempered ware, was the least frequent in occurrence, in Unit 2, shell-tempered ware was the most numerous. This is, of course, to be accounted for by the obvious occupancy of this portion of the midden by the later people of the Moundville complex who buried their dead in extended burials with much shell-tempered pottery and who scattered much shell-tempered pottery in the midden.

The distribution into types of ware and into subtypes of 985 sherds taken from blocks 4, 5, and 7 is shown in the following table. It will be observed that nearly half the sherds from these 3 blocks were shell-tempered, and of that half nearly all were plain undecorated wares. In table 7 is shown the distribution of 985 sherds by subtypes.

TABLE 7.—*Pottery types distributed into subtypes, blocks 4, 5, and 7*

Type No.	Temper	Decoration													Total
		a	b	c	d	e	f	g	h	j	k	m	bp	bf	
1	Fiber	66	101	44	4	5	5	2	2						229
2	Sand	44	30	8	4	2	14	2				2	1	9	116
3	Limestone	102	90	6	3			4	1	1	1				208
4	Clay-grit	16	2		6	6	1	1							32
5	Shell	396	2		1			1							400
Total															985

In Unit 2 the pottery zone seems to be about 3 feet thick. The following table shows the depth distribution of the various pottery wares. The distribution by depth of sherds from blocks 4, 5, and 7 is compared to the depth distribution of sherds from trenches about these same blocks. The three blocks yielded 985 sherds and none were below the 3-foot level; much more than half were in the 1-foot level. The trenches about these blocks, dug as trenches with the same care to keep a correct record, yielded 1,033 sherds, but a few (4 sherds) were as low as the 5-foot level. It is hard to believe that these four sherds were really found in situ. Rather, it is believed that in this case, as shown by table 8, six sherds fell out of the profiles or were dropped to lower depths as would be expected from data taken from trenches.

TABLE 8.—*Depth distribution of pottery by types in blocks 4, 5, and 7 compared to similar data from trenches isolating these blocks*

Depth (feet)	Pottery in blocks 4, 5, and 7							Pottery in trenches about blocks 4, 5, and 7						
	Fiber tempered	Sand tempered	Limestone tempered	Clay-grit tempered	Shell tempered	Total	Steatite	Fiber tempered	Sand tempered	Limestone tempered	Clay-grit tempered	Shell tempered	Total	S. S. V.
0.5														
1	115	64	101	35	260	565		96	83	153	15	186	533	1
1.5	59	34	32			114								
2	50	20	663	4	115	252	1	78	86	140	20	146	470	
2.5	5	7	7	3	14	36								
3		2	5		11	18		5	14	3		2	24	
3.5														
4												1	1	
4.5								1					1	
5								2				2	4	
Total	229	116	208	32	400	985	1	180	185	296	35	337	1,033	1
Percent	23.2	11.7	21.1	3.4	40.6	100		17.4	17.6	28.0	4.4	32.6	100	

The only complete pottery vessels were found in the pottery zone in association with burials of the Moundville complex. Many of these vessels appear to have been quite small and some were quite crude in manufacture, as shown in plate 122, figure 1. Some of the small vessels, however, were much more ornate as shown in plate 122, figure 3. Many shell-tempered vessels in the midden were broken, the fragments being large sections of the vessel. Sometimes these large sherds were placed in the graves. If a sherd is sufficiently large to show a considerable portion of the vessel, it is possible to estimate its curvature and other features very accurately. In plates 125 to 128, inclusive, are shown drawing restorations made from sherds of pottery vessels. The dimensions of these vessels are shown in table 9 and all measurements are in inches.

TABLE 9.—*Dimensions in inches of vessels shown in plates125–128*

Plate	Maximum diameter	Height	Mouth diameter	Neck diameter
125, fig. 1	5.5	4	6	4.5
125, fig. 2	14	12.75	10	
126, fig. 1	11.75	6.5	10	
126, fig. 2	13.5	12	11.75	
127, fig. 1	.5	3.75	4	
127, fig. 2	7.5	5.5	5.75	
128, fig. 1	.8	5.75	6	
128, fig. 2	6.25	4.5	6	

At the time of excavation in Unit 1, there were no burials recognized as being essentially different from the shell-mound complex. And, at the time of excavation of Unit 2, only 41 were recognized as belonging definitely to the Moundville type.

After the skeletal material was cleaned and restored in the laboratory, it was found possible to restore, from the 350 skeletons from the site, a total of 133 skeletons sufficiently well to make observation of type and sex fairly accurate.

After this restoration, it was possible to separate 44 skeletons from the 133 restored which, because of physical type, were different from the remaining 89. These 89 were the Shell Mound people, being similar in physical type to those taken from other shell middens. The 44 were the intrusive burials of the Moundville complex, being similar in physical type to those found on Koger's Island.

The result of classification of these 133 burials as to sex, type, and depth is presented in table 10.

TABLE 10.—*Depth distribution of burial types in Lu° 25* [1]

Foot level	Shell Mound types			Foot level	Koger's Island types		
	Male	Female	Total		Male	Female	Total
1	0	0	0	1	2 [2] 1	2	5
2	[1] 1	0	[1] 1	2	6 [2] 2	7	15
3	7 [1] 1	4	11 [1] 1	3	6 [2] 2	8	16
4	3 [1] 1	[1] 4	7 [1] 2	4	[2] 1	6 [2] 1	8
5	3 [1] 1	9	12 (1)	5			
6	17	12	29	6			
7	12	9 [3] 1	22	7			
8	2	1	3	8			
Total	48	41	89		20	24	44

[1] Doubtful. [2] Deformed. [3] Immature.

It will be observed that, of the 44 burials recognized as different in type from the Shell Mound dwellers, only 8 were in the 4-foot level and all the rest were above. Of the 89 burials recognized as definitely conforming to the shell-mound type, 12 were in the 3-foot level; only 1 was above that level and all the others were deeper than 3 feet.

This clearly demonstrates, by data taken largely from skeletal material, that the Moundville complex is intrusive into this site.

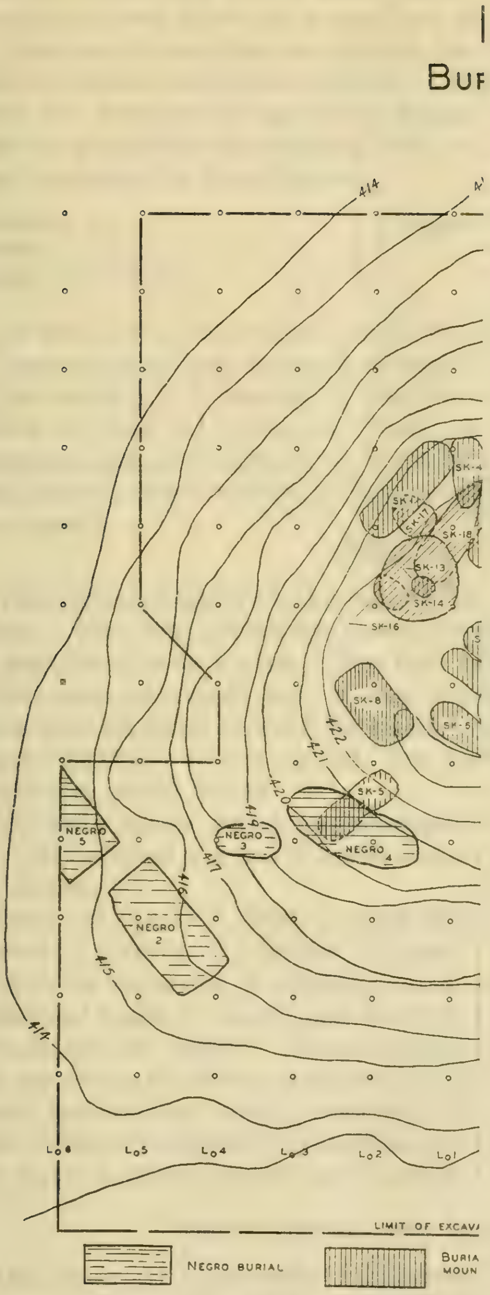
COLBERT CREEK MOUND, SITE Lu° 54

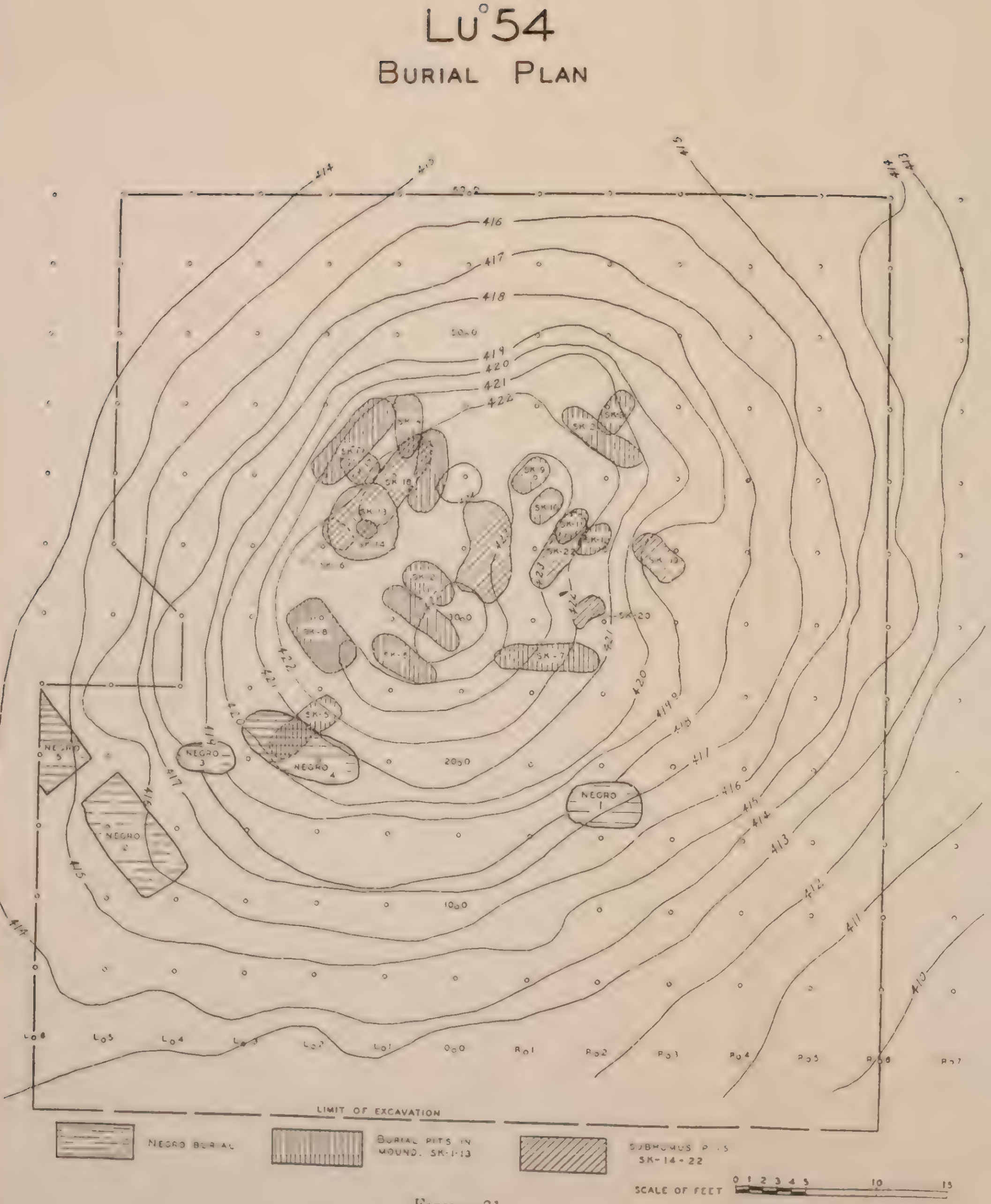
This was an earth mound, the larger of two mounds very close together, on the land of T. F. and A. W. Beckwith, about 15 miles west of Florence in Lauderdale County, Ala. These mounds were located about the center of the south half of sec. 29, T. 2 S., R. 13 W. This mound and its companion Lu° 53, which was not excavated, were near the mouth of Colbert Creek about 50 feet from its west bank and about 1,000 yards from the Tennessee River at its nearest point. These mounds stood on a small elevated point of land that was a part of the second river terrace, and which had been used in recent years as a negro burial ground known locally as the Johnson cemetery. These recent burials on this elevated terrace had extended to the smaller of the mounds, Lu° 53, shown on the right of plate 129, figure 1, which was not excavated for that reason.

Mound Lu° 54 was covered with a considerable stand of timber, as shown in plate 129, figure 1. It was cleared and staked, as shown in plate 129, figure 2, and the trenches were cut both on the west side and also on the east side to permit the best use of the labor crew.

The soil of this mound was a heavy red clay, containing some sand and a considerable quantity of chert pebbles, as shown by the 10- and 20-foot profiles in plate 129, figure 3, and plate 130, figure 1. Pits were extremely difficult to recognize because of the rocky nature of the soil. The mound proper was uniform in structure, for beside the original humus layer, and the present humus layer on top of the mound, there was no evidence of lenses or other soil changes. The mound was taken down in 5-foot cuts in the usual way, as shown in plate 130, figure 2, and pits when found were not immediately excavated but undisturbed earth about them was removed to convert the pit into a pedestal, as shown in plate 130, figures 1 and 3.

This site proved to be a burial mound of the Copena Focus, which in comparison with other mounds of this same focus was not a rich site either in material or information obtained. Twenty-two burials were found in the mound, each in its own pit. Fourteen of these pits were dug in the mound as shown by the horizontal plan of the burial pits, and eight of these pits extended into the hardpan from the old village surface, as shown in figure 21. In all cases the skeletal material was in an extremely poor state of preservation, as illustrated by plate 131, figures 2, 3; plate 132, figure 1. Usually, only the enamel caps of teeth and a few fragments of skull remained. Burials occurred both in the made dirt of the mound and in subsoil pits that


BUF
414
41
SK-4
SK-1
SK-17
SK-18
SK-13
SK-14
SK-16
SK-8
SK-5
422
421
420
419
SK-5
NEGRO 5
NEGRO 3
NEGRO 4
417
416
NEGRO 2
415
414
Lo6
Lo5
Lo4
Lo3
Lo2
Lo1
LIMIT OF EXCAVA
NEGRO BURIAL
BURIA
MOUN



Lu°54
BURIAL PLAN
416
417
418
419
420
421
422
SK-1
SK-2
SK-3
SK-4
SK-5
SK-6
SK-7
SK-8
SK-9
SK-10
SK-11
SK-12
SK-13
SK-14
SK-15
SK-16
SK-18
SK-20
SK-22
NEGRO 1
NEGRO 2
NEGRO 3
NEGRO 4
NEGRO 5
415
414
413
412
411
410
30₀0
20₀0
10₀0
0₀0
L₀6
L₀5
L₀4
L₀3
L₀2
L₀1
R₀1
R₀2
R₀3
R₀4
R₀5
R₀6
R₀7
LIMIT OF EXCAVATION
NEGRO BURIAL
BURIAL PITS IN MOUND. SK-1-13
SUBHUMUS PITS SK-14-22
SCALE OF FEET
0 1 2 3 4 5 10 15

FIGURE 21.

245407—41 (Face p. 92)

went down through the old humus layer. Both extended and bundle burials occurred below the mound base at the lowest levels.

It appeared that this site yielded few new traits of this complex and no unusual features or artifacts. The pits and burials, therefore, were not described in individual detail. From the size of the pits and the placement of remaining bone fragments, the form of burials was determined to be as follows:

Extended	8	Indeterminate	7
Flexed	6		——
Bundle burial of bones	1	Total	22

Of these 22 burials, 9 had associated artifacts or galena balls and 13 were without any material definitely in association. In several of the burial pits, a covering of charred wood was plainly evident, as shown in plate 131, figure 2. There was, however, no evidence of cremation and seemingly no use of puddled clay in the graves. Plate 131, figure 1, shows the base of the mound, cleared, with pits extending into subsoil.

ARTIFACTS

The artifacts taken from this mound were all typical of the Copena Focus. Five large greenstone spades were found, three of which were in association with burials. Ten balls of galena and many smaller pellets were recovered; some of these were in burial association, and some were scattered through the mound. Two greenstone celts were found "floating" in the mound, and one flint projectile point was found with burial No. 14.

The only copper found was represented by two strings of beads, one with a burial and one of seven long cylindrical beads, found near the surface.

Plate 132, figure 2, shows 2 small balls of galena and 10 pieces of worked flint from the general digging. One of these, third from right in the lower row, is a fragment of a typical Folsom point. Four cylindrical beads of copper and the only two potsherds found in the mounds are also shown. These sherds are plain and hole-tempered and are evidently chance inclusions in the mound. Past experience would indicate that these sherds were probably limestone-tempered ware. Plate 133, figure 1, shows two small greenstone celts, and plate 133, figure 2, shows two of the five greenstone spades.

Bluff Creek, Site Lu° 59

This site is 14 miles west of Florence, Ala., on the banks of the Tennessee River in the SW¼ of the SW¼, sec. 18, T. 2 S., R. 13 W. It is about 1,500 feet east of the mouth of Bluff Creek, on land owned by Emmet O'Neal of Florence, Ala., which has been cultivated for some 17 years prior to 1937 by James Boatwright.

The site is a typical shell mound, or midden, which had accumulated on the immediate bank of the Tennessee River. Plate 134, figure 1, shows the mound at the time of cutting Johnson grass for hay. The road shown in the foreground was used in pioneer days to haul logs onto the mound in lumbering operations. The mound itself was for some time used as a steamboat landing. Nails and other small foreign objects from these activities have penetrated a foot or more into the surface.

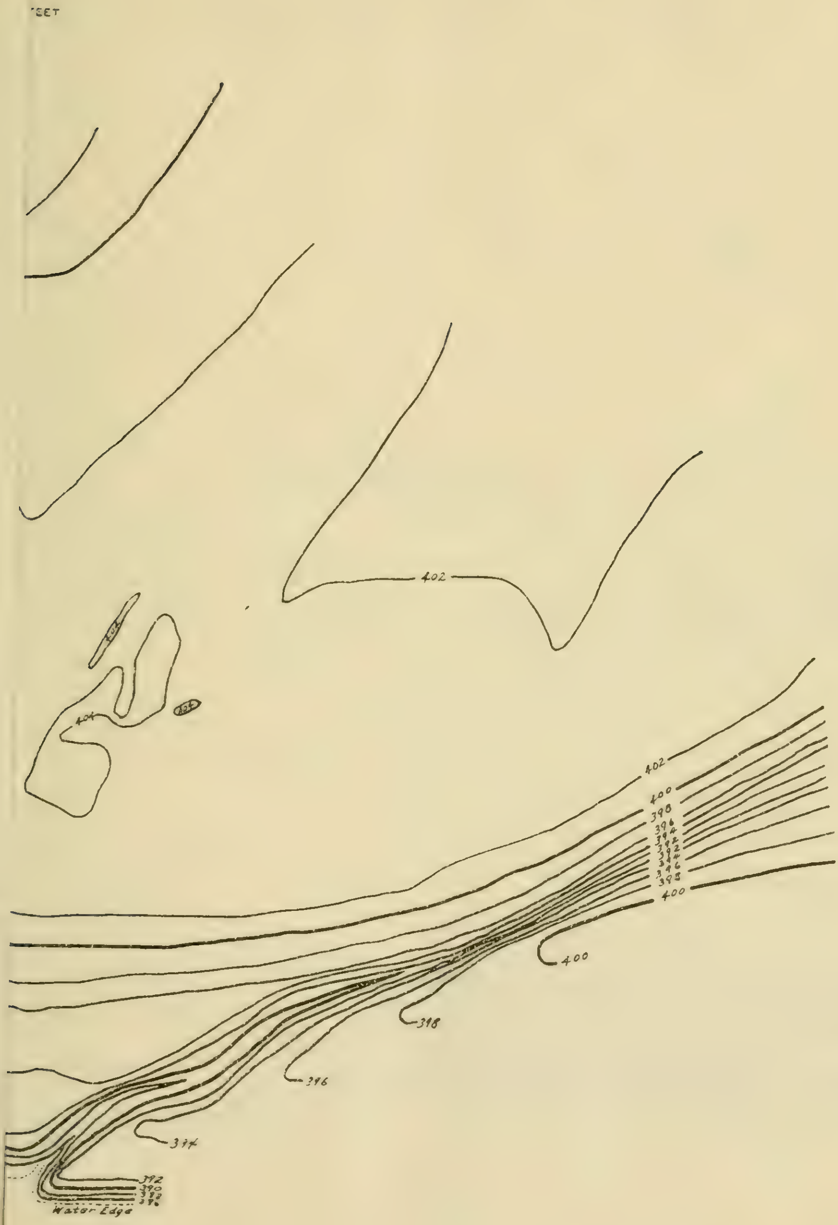
The flood plain at this point is about 20 feet higher than normal river level. Along the bank, on this flood plain, shell and midden debris accumulated to form a ridge extending some 550 feet along the river and having a width from 100 to 170 feet. The average depth of the shell probably exceeds 10 feet. At the western end of this ridge, shell accumulated to a much greater depth, producing a shell mound on this ridge. This mound was about 230 feet E.-W. and 170 feet N.-S. Excavation revealed a total depth of shell in excess of 16 feet. No attempt was made to work out the exact boundaries of the shell ridge, the edges of which had merged with the soil of the flood plain due to deposition of silt and long cultivation.

Erosion is apparent on the river face of the site. The topography to the west and directly abutting the site has been modified by a rather thick water-lain fill not found on the eastern portion of the site, and probably explainable by the eddy formed downstream by the prominence of the site itself. This is somewhat important in understanding the contour map of the site shown in figure 22.

Many times in the past the site has been completely inundated by floods, but normal flooding of the river rarely covers the entire site while inundating the intervening lowlands to the cliff escarpment. The possibility of admixtures of cultural material by flooding is very remote in view of the efficient interlocking of the shells. A few recently cut trees and a heavy coat of Johnson grass covering the whole ridge have prevented any noticeable erosion in recent years.

The cultural detritus rests on a homogeneous, hard, impervious yellow clay of undetermined thickness. This is the native clay found all along the river bank both above and below the site. Directly abutting this shell mound in the river is a region of shoals from which several islands rise. These, until recently cleared, were covered with a dense stand of timber, as shown in plate 135, figure 1. The presence of the shoals in the river at this point produced the ecological condition necessary to the development of a varied river fauna, which included many species of pelecypods and gastropods. Hence, the material for building the mound was near at hand.

From the presence of the shoals and from the present topography one might infer that at the time of occupation of the site the mouth of Bluff Creek was much closer to the site than at present. The shell


EET
402
404
402
400
398
396
394
392
392
394
396
398
400
400
398
396
394
392
390
388
390
Water Edge

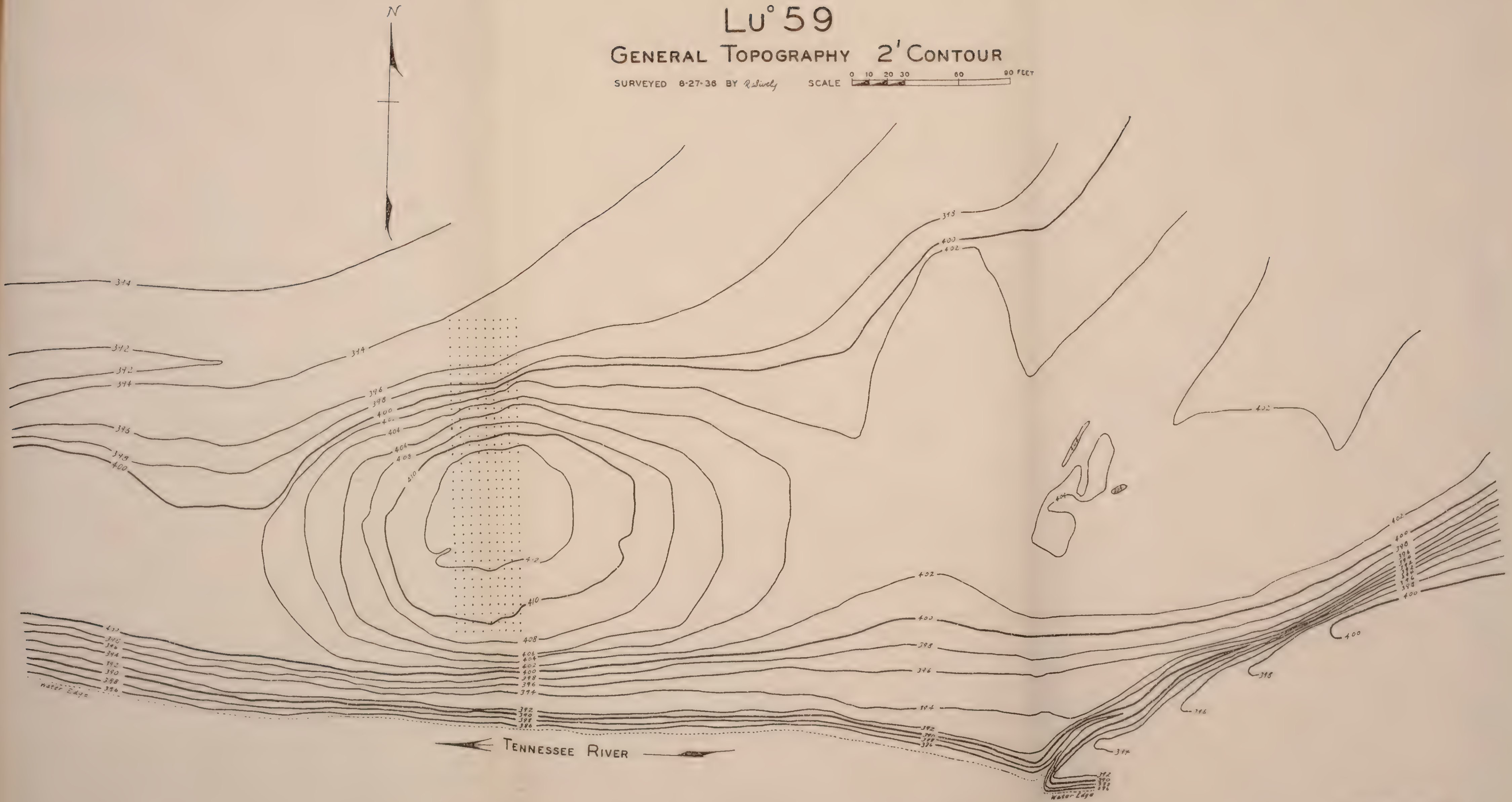

N
Lu° 59
General Topography 2' Contour
Surveyed 8-27-38 by R. Sively
Scale 0 10 20 30 60 90 feet
394
392
396
398
400
402
404
406
408
410
412
390
388
386
Water Edge
Tennessee River

Figure 22.

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mound appears to have been located on an original flood plain of Bluff Creek which has cut through the flood plain of the Tennessee River. The river at this point has no definite terraces, although it has a well-developed flood plain which, except for minor sloughs, extends unbrokenly back from the river for a distance of about half a mile to a sheer limestone escarpment, rising from 100 to 150 feet above the river. The vegetation on these escarpments and the back-lying hills is definitely of the park type.

Some 1,000 feet to the east of this site is another shell mound, Lu^{o} 61, which was investigated later, and about 1,500 feet to the west there is a village site, Lu^{v} 62, the occupation level of which appears high up on the face of a meander scar on the west side of Bluff Creek.

A fine spring is to be found at the foot of the limestone bluffs some 2,000 feet to the southeast.

METHOD OF EXCAVATING

Previous experience in excavation of shell mounds had seemed to indicate that possibly a somewhat different technique might be productive of increased information. Vertical slicing in 5-foot profiles had left much to be desired. Lenses of occupation, clay floors, and fire hearths were obvious in every profile but so variable in thickness that it was difficult to relate consecutive profiles or to get a clear picture of what was the method of deposition of the shell. In excavating this site, it was determined that parallel trenches some distance apart would be run into the mound. Then the midden between these trenches would be cut into a block which could be completely surrounded and the profiles read on all four faces. The block could be taken down in 6-inch levels by natural zones. It was hoped by this method to be able to see how the profiles changed from cut to cut, and thus be able to learn how the shell was deposited. Another distinct advantage to be gained was that in cutting down the separate block there would be no adjacent profiles exposed from which artifacts could "drop" to lower levels, and thus "fog" the count record. This method is illustrated in plate 162, figure 1. With this in view, the mound was staked in a strip over the highest point in 5-foot squares. The strip was 40 feet wide E.–W. and 175 feet S.–N. The form of staking is shown in the ground plan of the excavations, figure 23.

The base line 40 feet wide extended 20 feet to the left of 0.0 to L4 and 20 feet to the right of 0.0 to R4. Two 5-foot cuts L3 and R4 were driven into the mound and cut down to base level to the 70-foot profile, as shown in plate 134, figure 3, and later extended into the mound to the 125-foot profile, but this later extension went to a depth of only 9 feet leaving a layer of 8 feet of shell at the bottom of the trench not excavated. Between these two trenches there remained

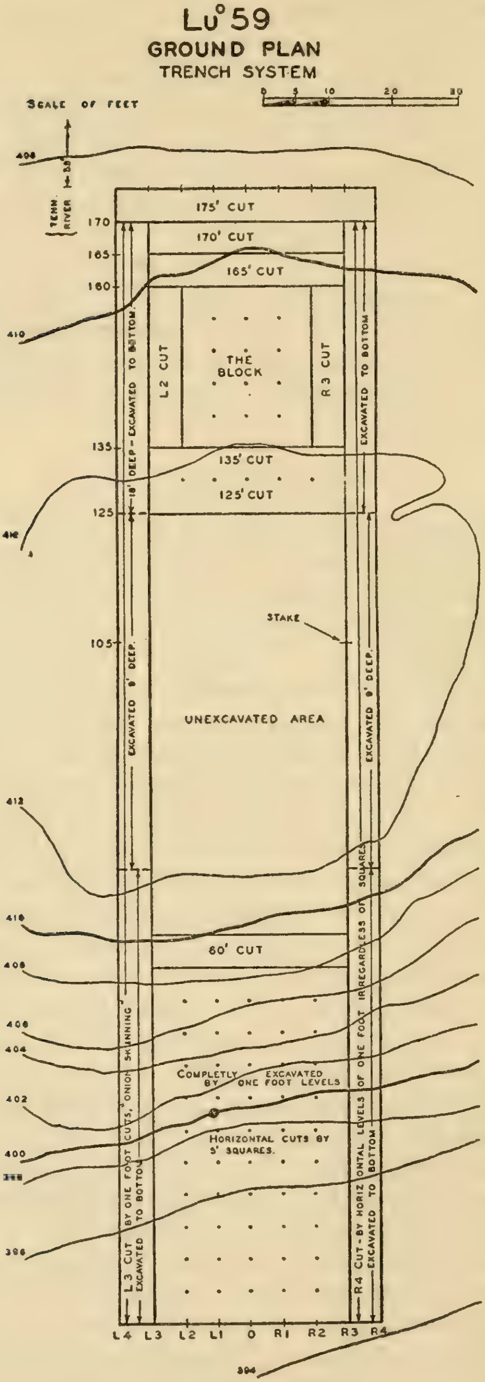

Lu°59
GROUND PLAN
TRENCH SYSTEM
SCALE OF FEET
0 5 10 20 30
TENN. RIVER
175' CUT
170' CUT
165' CUT
THE BLOCK
L2 CUT
R3 CUT
135' CUT
125' CUT
STAKE
UNEXCAVATED AREA
60' CUT
COMPLETELY EXCAVATED BY ONE FOOT LEVELS
HORIZONTAL CUTS BY 5' SQUARES.
18' DEEP - EXCAVATED TO BOTTOM
EXCAVATED TO BOTTOM
EXCAVATED 8' DEEP.
L3 CUT BY ONE FOOT CUTS, ONION SKINNING
EXCAVATED TO BOTTOM
R4 CUT - BY HORIZONTAL LEVELS OF ONE FOOT IRREGARDLESS OF SQUARES
EXCAVATED TO BOTTOM
170
165
160
135
125
105
410
412
L4 L3 L2 L1 0 R1 R2 R3 R4
400
402
404
406
408
396
394

FIGURE 23.

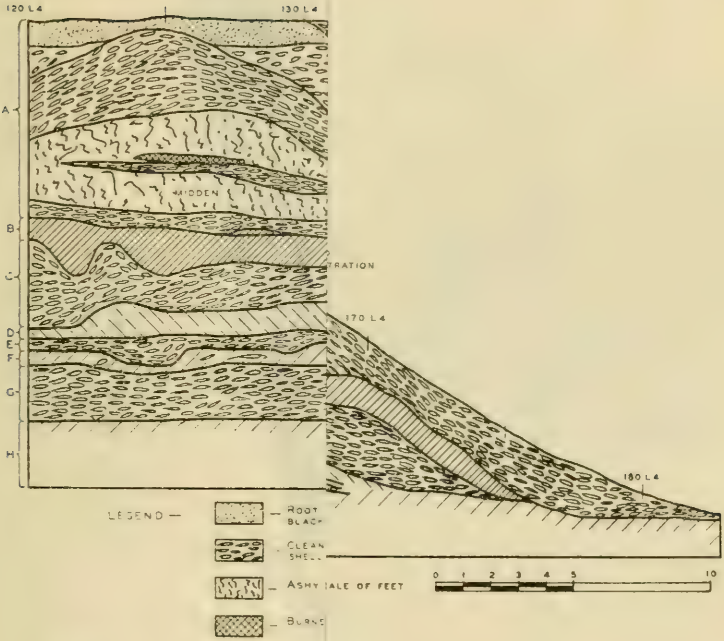
a block of the mound 30 feet wide E.–W. This was cut down in 5-foot cuts in 5-foot squares beginning on the south end. These cuts were carried down to mound base, and all material was collected by 1-foot levels. This was continued to the 60-foot cut. The method of excavation is shown in plate 134, figure 3. It was necessary to use sloping walls on the L3 and R4 cuts to prevent landslides and to step down the cuts on the north profiles in 2- to 3-foot levels, as shown in plate 134, figure 2, in order to prevent landslides. This work was started in the fall of 1936, and because of the rain and winter weather several costly "cave-ins" occurred in spite of the greatest precautions. By the time the 60-foot profile was reached it appeared that the mound had been built on occupational levels which sloped slightly to the north away from the river, and it was felt that consequent erosion might have been more important on this side of the mound than was apparent. Since every effort was to be made to detect stratigraphy if it existed, it was considered wise to begin a cut on the south side of the mound where the natural zones might be found less disturbed. Accordingly the 170-foot cut was made as shown in plate 135, figure 2, and the L3 and R4 trenches were extended from that profile through the mound to connect with the excavated portion at the 125-foot profile. All of the discarded earth was removed to the river bank and dumped in the river. This prevented an accumulation of earth and consequent pressure on the mound above the profiles.

The 170-foot cut was taken down, followed by the 165-foot cut, by 1-foot levels in natural zones. This exposed the 160-foot profile, as shown in plate 144, figure 1. On this profile the natural zones were selected, designated A to H, and marked by stretched strings as shown. The L2 and R3 cuts were then carried down at the same time along with the 135-foot cut and the 125-foot cut which were carried down together. This left standing a block 20 feet wide E.–W. and 25 feet long N.–S. with an average depth of profile of about 18 feet. When this stage of the excavation was reached, late spring had come, and it was hoped that these deep profiles would stand till the central block could be investigated. Profiles as deep as 18 feet in shell mound are never very safe for the workmen, and it was only because of coming of dry weather and a pressing desire to follow these natural zones completely around an area sufficiently large to encompass an occupational layer that such techniques were considered justified. Fortunately, these walls stood well for several months in the summer of 1937 during which time nearly the whole central block was cut down with utmost care. Near the close of the excavation, an exceptionally heavy storm brought a deluge of rain on a day when no work was being done. One of the outside walls gave way in a great slide, fell on a corner of the unfinished block, and broke off a portion of it. It was possible, however, to clean up the debris and later proceed with the block till all was finished and the site abandoned in favor of other sites awaiting investigation. In this connection, it may be stated, as an opinion, that vertical profiles in shell mounds may be maintained in dry weather as deep as 18 feet without serious danger, if care is used to cut the walls exactly vertical, with no undercuts, and if workmen are kept away from the vertical edge overhead. This necessitates the partial sacrifice of any skeleton or feature lying in the profile. Any attempt to "undercut" to save such material ends in disaster. The excavated dirt should not be piled up above the profile, but must be otherwise disposed of to avoid pressure. Careful watch should be maintained at all times to note any development of cracks in the vertical walls or any evidence of slow creeping which is often indicated by small objects falling out of the vertical face of the exposed profile.

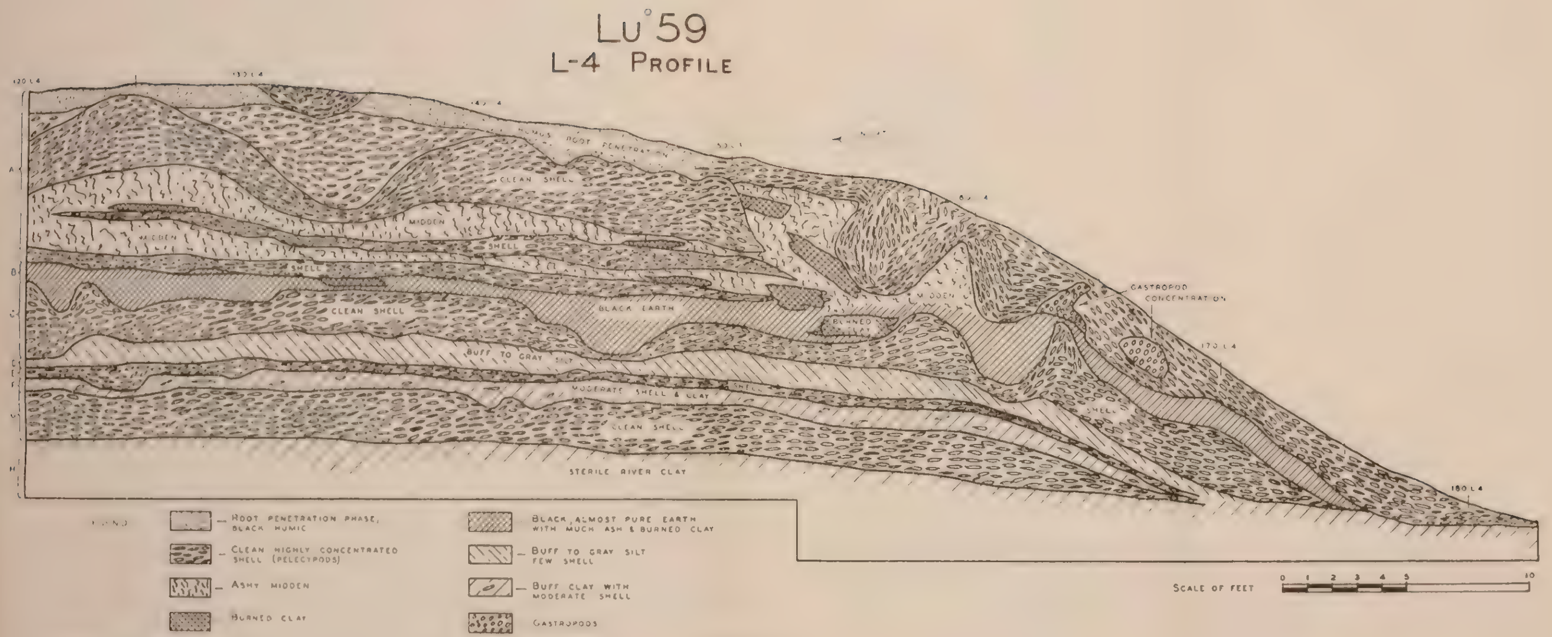
With this central block lying between the 135-foot and the 160-foot profile exposed on all four sides, it was possible to investigate the extent and variation of the natural zones to great advantage. Plate 144, figure 2, shows this central block with the top of zone "A" removed. Plate 145, figure 1, shows how the block was cut down in 5-foot squares in 6-inch levels. Each zone boundary was carefully cleaned and searched in the hope it might have some especial occupational evidence. Plate 145, figure 2, shows this method of investigation of the top of zone "B." This revealed a ground-hog den shown at right of block and in more detail in plate 162, figure 2. Obviously, material from the den fill was "out of place" and data from it unreliable. Plate 146, figure 1, shows the top surface of zone "E" and the top of zone "G" is shown in plate 146, figure 2.

After the "block" lying between the 135-foot and 160-foot profiles was exposed, there remained for study the R4 and the L4 profiles from the 180-foot stake to the 120-foot stake, the 120-foot profile, and the four faces of the block. All of these profiles are shown in the ground plan of the excavation figure 23. These profiles were carefully studied before excavations proceeded in order to glean all possible information of the method of construction of the midden. These profiles were carefully drawn and are presented in figures 24 to 27 inclusive. Figure 24 presents the R4 profile from stake 180 to 120. Figure 25 presents the L4 profile from stake 180 to 120. Figure 26 presents the 120-foot profile from R4 to L4 and figure 27 presents the profile on the four faces of the "block."

An inspection of these profiles emphasizes the distinct character of the eight or more natural zones which are easily apparent, and which, because of their definite separation, plainly suggest distinct and sometimes abrupt changes of conditions in the building of this midden. For the entire mound the maximum shell accumulation is about 17.5 feet thick. This depth tapers to zero at the margins. For the "block"


120 L4
130 L4
A
B
C
D
E
F
G
H
MIDDEN
TRATION
170 L4
180 L4
LEGEND —
ROOT
BLACK
CLEAN
SHELL
ASHY
ALE OF FEET
BURNE
0
1
2
3
4
5
10

245407—41 (Face p. 99)


Lu°59
L-4 PROFILE
120 L4
Humus root penetration
Clean shell
Midden
Midden
Shell
Shell
Clean shell
Black earth
Burned
Midden
Gastropod concentration
170 L4
Buff to gray silt
Moderate shell & clay
Shell
Clean shell
Sterile river clay
180 L4
A
B
C
D
E
F
G
H
Legend
Root penetration phase, black humic
Clean highly concentrated shell (pelecypods)
Ashy midden
Burned clay
Black, almost pure earth with much ash & burned clay
Buff to gray silt few shell
Buff clay with moderate shell
Gastropods
Scale of feet
0 1 2 3 4 5 10

245407—41 (Face p. 99)

FIGURE 25.

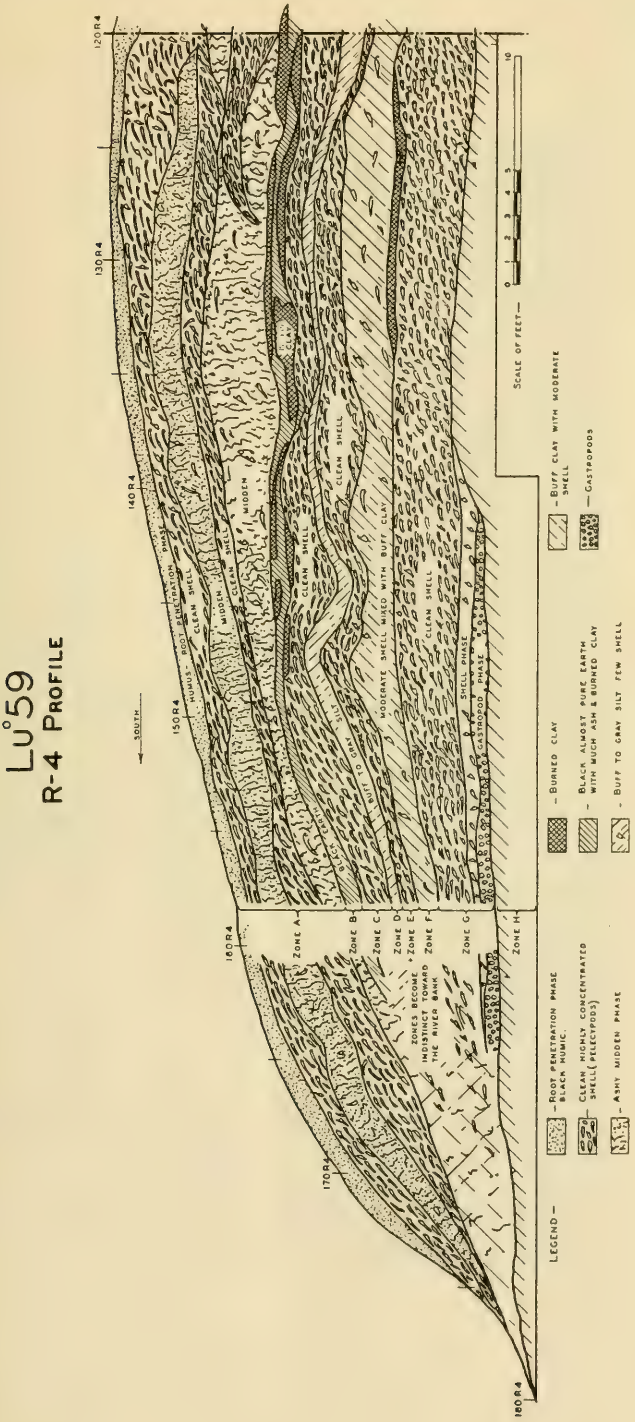

Lu°59
R-4 Profile
South
120 R4
130 R4
140 R4
150 R4
160 R4
170 R4
180 R4
Humus- Root penetration phase
Clean shell
Midden
Clean shell
Midden
Clay
Clean shell
Clean shell
Clean shell
Black earth
Buff to gray silt
Moderate shell mixed with buff clay
Clean shell
Shell phase
Gastropod phase
Zone A
Zone B
Zone C
Zone D
Zone E
Zone F
Zone G
Zone H
Zones become indistinct toward the river bank
Scale of feet —
0
1
2
3
4
5
10
Legend —
Root penetration phase black humic.
Clean highly concentrated shell (pelecypods)
Ashy midden phase
Burned clay
Black almost pure earth with much ash & burned clay
Buff to gray silt few shell
Buff clay with moderate shell
Gastropods

FIGURE 24.

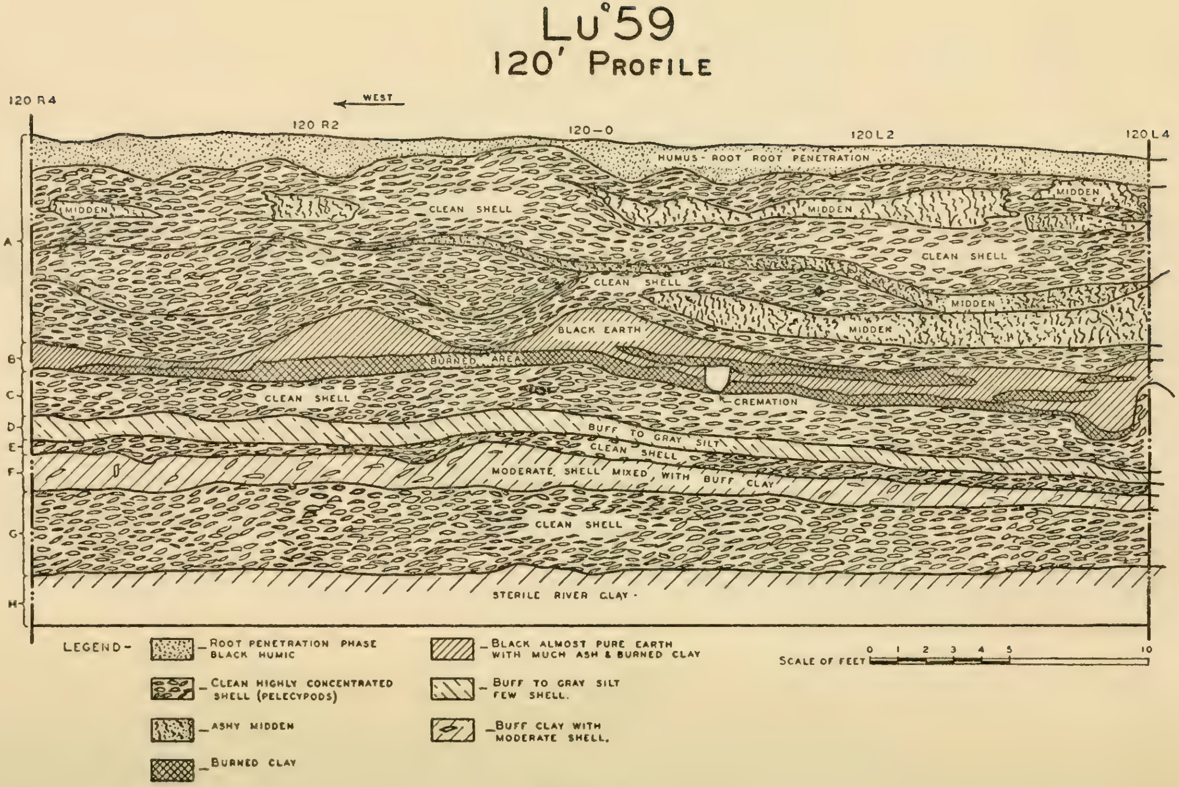
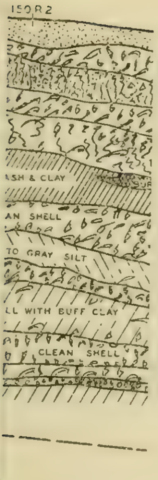

Lu°59
120' Profile
West
120 R4
120 R2
120—0
120 L2
120 L4
Humus - root root penetration
Midden
Clean shell
Midden
Midden
Clean shell
Clean shell
Midden
Midden
Black earth
Burned area
Clean shell
Cremation
Buff to gray silt
Clean shell
Moderate, shell mixed, with buff clay
Clean shell
Sterile river clay
A
B
C
D
E
F
G
H
Legend—
Root penetration phase black humic
Clean highly concentrated shell (pelecypods)
Ashy midden
Burned clay
Black almost pure earth with much ash & burned clay
Buff to gray silt few shell.
Buff clay with moderate shell.
Scale of feet
0 1 2 3 4 5 10

Figure 26.


150R2
ASH & CLAY
SUR
AN SHELL
TO GRAY SILT
LL WITH BUFF CLAY
CLEAN SHELL

Lu°59
DEVELOPMENT OF CENTER BLOCK

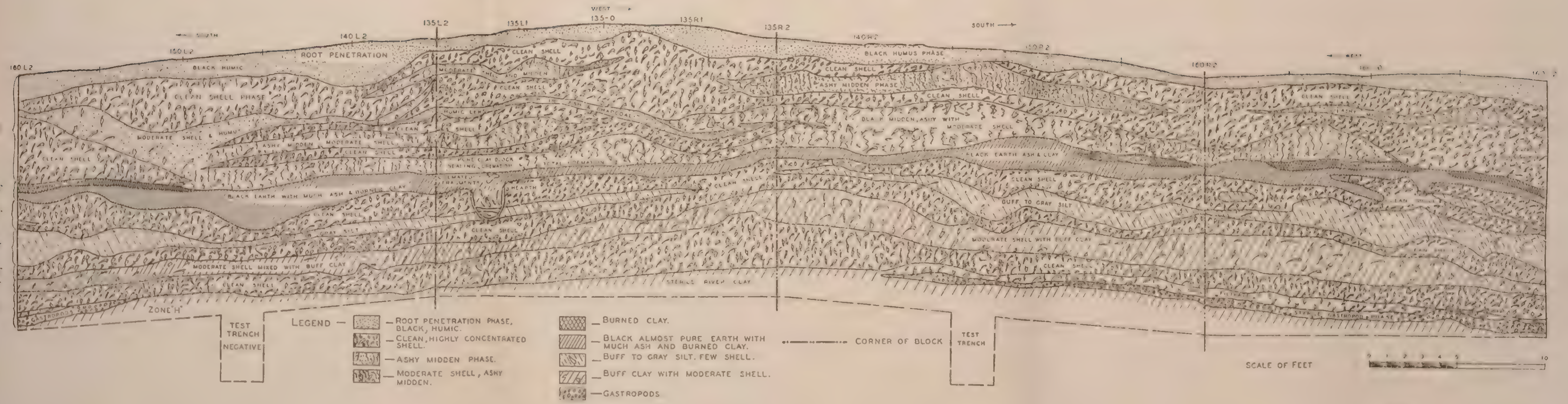

WEST
SOUTH
135L2
135L1
135-0
135R1
135R2
140L2
140R2
150L2
150R2
160L2
160R2
ROOT PENETRATION
BLACK HUMIC
BLACK HUMUS PHASE
CLEAN SHELL PHASE
CLEAN SHELL
ASHY MIDDEN PHASE
MODERATE SHELL & HUMUS
ASHY MIDDEN, MODERATE SHELL
BLACK EARTH ASH & CLAY
BLACK EARTH WITH MUCH ASH & BURNED CLAY
BUFF TO GRAY SILT
MODERATE SHELL WITH BUFF CLAY
MODERATE SHELL MIXED WITH BUFF CLAY
STERILE RIVER CLAY
GASTROPODS
HEARTH
ZONE A
ZONE B
ZONE C
ZONE D
ZONE E
ZONE F
ZONE G
ZONE H
TEST TRENCH NEGATIVE
TEST TRENCH
LEGEND
ROOT PENETRATION PHASE, BLACK, HUMIC.
CLEAN, HIGHLY CONCENTRATED SHELL.
ASHY MIDDEN PHASE.
MODERATE SHELL, ASHY MIDDEN.
BURNED CLAY.
BLACK ALMOST PURE EARTH WITH MUCH ASH AND BURNED CLAY.
BUFF TO GRAY SILT. FEW SHELL.
BUFF CLAY WITH MODERATE SHELL.
GASTROPODS
CORNER OF BLOCK
SCALE OF FEET
0
1
2
3
4
5
10

FIGURE 27.

the maximum depth of accumulation was 16.5 feet and the minimum depth about 14.5 feet.

There were eight natural zones which varied in thickness and in elevation from point to point, yet maintained their continuity across the "block" and into the outside profiles. It was apparent in the lower zones that the river had played an important part in bringing the shell midden to its present condition. Evidence seems to indicate that on several occasions the river had risen to flood the site—bringing in a mixture of fine sand and clay, and depositing it on top of what otherwise would have been layers of clean shell. Under such circumstances, it would seem that the stream velocity was never very great, and where 6 to 10 inches of very fine silt was deposited on a shell layer the silt would at once infiltrate deep down into the shell layer and fill up the interstices. Probably by the simple process of partial flotation, the individual shell would be slightly lifted into the silt layer while it was being deposited. This resulted, after the subsidence of the flood, in a zone of mingled shell and silt—shell which had too much silt to have been laid by man, and a silt layer containing too dense a shell content to have been transported as a secondary deposit by river floods. It is to be noted in certain zones that there are sometimes broad but thin layers of gastropod shells on the top surface of infiltrated zones. These gastropods, of course, could have been deposited by man separately from the other shells, but when found concentrated in the upper surface of such an infiltrated zone it does not seem improbable that the gastropods could have become separated from the pelecypods by flotation due to their form and to the possibilities of having been caught when full of air. Under such circumstances, the gastropod shells, fortuitously situated, would float up through the muddy water as it settled the silt into the lower shell layer, and thus slight stratigraphy would be noticeable within these infiltrated zones. The appearance of the lower zones seem to indicate that after deposit by man they have been modified by flood action in some such way as described. Further, such zones as were thus flooded would lose all ash content by solution, and humic material would be redeposited and infiltrated in the shell. It would be expected that in such a case no zone of "clean shell" could be found under a zone showing infiltration.

Once a mound has been raised by occupation to a height above any flood level, there, of course, would be no water-infiltrated zones above that point. On any occupational level ashes would accumulate along with black humic material, and both would retain obvious evidence of their character. Further, on any occupational level shell would accumulate in great lenses from zero thickness at the edge to a thickness of several feet at the center. Such lenses of shell being subject to the washing of rain and exposure to sun would form layers of clean shell. These too would retain their clean compact character even if later occupation should occur over them, since without an excess of water little if any infiltration occurs. Whatever be the proper explanation of the natural zones in shell mounds, as exemplified by this site, the fact remains that zones of black midden, ash layers, and layers of clean shell occur only in the upper zones. Shell layers with infiltrated clay, silt, and sand occur only in the lower zones

HALF-FOOT LEVELS	TOTAL SHERDS
0.5	341
1.0	411
1.5	194
2.0	179
2.5	52
3.0	47
3.5	27
4.0	22
4.5	21
5.0	15
5.5	15
6.0	2

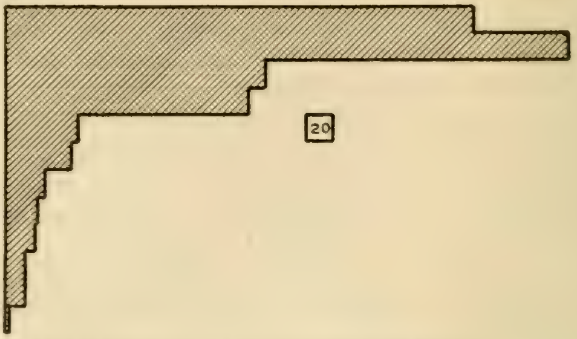


FIGURE 28.—Depth distribution of ceramic types, site Lu° 59.

FOOT LEVEL	FROM "BLOCK"	FROM UNDISTURBED CUTS	TOTAL
1	4	39	43
2	14	67	81
3	9	68	77
4	23	56	79
5	26	47	73
6	12	14	26
7		4	4
8		4	4
9		2	2
10		3	3
11		1	1
12		0	0
13		1	1
14			0
15			0
16			0
17			0
	88	306	394

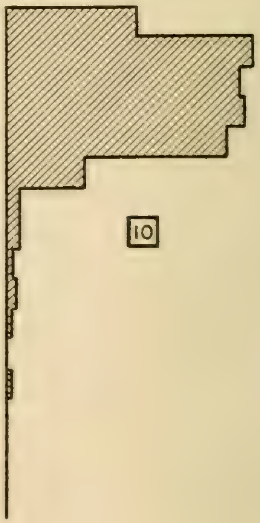


FIGURE 29.—Distribution of bone projectile points, site Lu° 59.

where there are no ashes and no clean shell layers. The eight natural zones apparent at this site have been designated A to H inclusive and are described as they appear on the central block.

Zone A.—This zone averages 6 feet in thickness and varies from 5.5 feet to nearly 8 feet in thickness. The upper foot represents a root and grass penetration into a black vegetative humus layer. Under this humus phase of zone A is a layer of clean shell varying in thickness from 1 to nearly 2 feet, constituted almost entirely of pelecypods. Beneath this layer is a true midden phase containing a slight amount of ash and charcoal with much stone rubble and other midden materials. This midden, an ashy phase of zone A, roughly corresponds to the 2.5-foot level, and it possibly represents an intense occupation at that level. This layer is only about 6 inches thick on the average, and extends over the whole mound at a depth of 3 feet. Its significance may be suggested by the facts presented in figure 28 showing "Depth Distribution of Ceramic Types."

Below this midden phase and keeping about at the 3-foot depth is a layer of clean shell, mostly pelecypods. This layer is from 1 foot to 2.5 feet in thickness, the lenses of clear shell varying in thickness from square to square rather abruptly. This layer in turn is underlaid by a heavy midden layer, gray in color, and contains much ash and charcoal, animal bone, and the usual debris of a midden. It contains some shell, but is quite distinct from the clean-shell layer above it. This layer forms the base of zone A, and it is at a depth of about 6 feet over the central portion of the mound. No potsherds are found below this midden layer, and its significance may be suggested by observance of the chart (fig. 29) showing "Distribution of Bone Projectile Points."

Zone B.—This is a black midden layer varying from 1 to 2 feet in thickness which extends over the whole mound. The average thickness is about 1.5 feet. It contains the usual midden material—broken river pebbles, and much burned clay—but is free from shell. Evidence of fire is plentiful, and occasional burned areas show fire hearths in situ. Occasional scattered post molds are apparent, but they are too few to suggest any pattern.

Zone C.—This is a clean-shell layer almost wholly pelecypods. It was conspicuous as a layer about 1.5 feet thick over the whole block because the shell was clean and evenly horizontally bedded.

Zone D.—This was a buff and slightly grayish-colored layer of fine-grained clay with some shell and stone rubble. This layer was about 1.5 feet thick. It contained some artifacts and bone but no ash. The relatively small amount of shell in the clay matrix was well compacted.

Zone E.—This was a horizontally bedded zone of shell—very compact. There appeared to have been considerable infiltration of silt from zone D into this shell layer which was about 1 foot thick.

Zone F.—This zone was a buff-colored clay nearly identical in kind with zone D, but about 3 feet thick. It contained a minor quantity of shell infiltrated into it—noticeably gastropods. This zone was clearly a river deposit from backwater which had no considerable stream velocity.

Zone G.—This was a closely compacted, horizontally bedded shell layer about 2 feet thick into which some clay had infiltrated from the zone above. Gastropods predominated at the surface of this zone.

Zone H.—This was a buff-colored river-deposited clay, about 1 foot thick, generally sterile of artifacts or shell except for a few surface infiltrations.

It is apparent from the description of these natural zones that at least zone A might have been separated into two cultural levels. Conversely, as will appear later, many of these very distinct boundaries between natural zones seem to have had no cultural significance whatever. This is additional evidence for believing that river floods rather than occupational changes in the early history of the shell mounds are responsible for the "natural zoning" which is so conspicuous a characteristic on all such sites.

FEATURES

Scattered through this shell midden from top to bottom was evidence of human occupancy at all levels. Piles of limestone rock, piles of fire-broken river pebbles, clay-covered areas showing the action of fire, ash beds, charcoal areas, pits containing loose burned shell, and occasional scattered post molds all bore witness to the occupancy of the site. If every fire basin, every pit, or every clay-floored area had been described as a feature, the list would have reached into the hundreds. Such evidences were very numerous, yet there were practically no well-constructed works which indicate any permanency of occupation on any small area. Fire basins were not well made or hard burned, but seemed to have been built to serve only the purpose of the moment. Areas covered with clay were not large, and the clay was uneven in thickness and not very smooth on the surface. Pits containing charcoal and burned mussel shell, which may have represented "clam bakes" or "barbecue holes," as denominated by Fowke (1928, p. 440), seem to have been used only once, or but a few times at the most.

All such evidences of the use of fire seem to suggest that the type of occupancy of the shell mound might be well described as "camping." There was nothing to suggest any special care in the construction of any permanent feature in the midden. The attempt to list or describe important features in this site emphasizes at once this transient character of all construction, and forces one to the conclusion that there must have been, at all times, a very considerable shifting about of the small areas of occupation on top of the shell midden. The number of pits containing ashes, charcoal, burned rock, and burned shell also impresses one with the very considerable amount of digging into the shell, aside from the burials, which was done by the occupants at all times.

One is also impressed with the numerous evidences of the use of fire. There were no very large accumulations of ash and charcoal such as might be expected from large fires long continued. All fireplaces were small and associated generally with many fire-cracked river pebbles. Even in the very deep prepottery zones, these broken river pebbles which show fracture by fire and which are scattered throughout the mound would definitely suggest that river pebbles were purposely used in some process connected with fire. It is suggested that these broken river pebbles, which constitute in some areas as much as 5 percent of the total mound accumulation, represent the "wastage" in the process of cooking or partially cooking of the shellfish. Perhaps the shellfish fresh from the river were placed in water in a container which could not be put on the fire. (Nearly all of these middens are prepottery.) River pebbles were heated until hot in nearby fires and dumped into the water in the container. The shellfish were thus partially cooked. The heat caused the shellfish to partially leave their shells, and they were thus easily eaten. The pebbles would finally be broken by this process and be cast away in the "wastage." Whatever the reason for their accumulation or the method of their use, the fact remains that scattered, burned, and broken river pebbles are an important feature of this and other shell middens.

In view of the above statement only a few of the special minor features from this site will be separately described.

Feature No. 1.—This was a circular area 3.8 feet in diameter at a depth of 3.7 feet in square 75R3, which was covered with many large and small limestone rocks, all showing the effect of fire. Beneath the stones was an ash bed containing much charcoal and some burned shell.

Feature No. 2.—This was a clay-covered floor at a depth of 6.3 feet in square 80L3. This floor extended into square 105L3 at the same level. In one portion of it an area 4 feet in diameter had been hard burned, and near it were four well-defined post molds, in no special order.

Feature No. 3.—This was a fire basin at a depth of 5.9 feet in square 110R4. This basin, about 14 inches in diameter, was made of puddled clay and was circular in form with flat bottom and vertical walls.

Feature No. 5.—This was a burned area surrounded by ashes at a depth of 2 feet. A layer of clay was over all with a pit in association. The pit was 2.5 feet in diameter and 4 inches deep in the center. It was basinlike and filled with ashes, broken rock, and clean shell. Plate 143, figure 2, shows this feature and shows how a layer of clay 2 inches thick covered this burned area. The shell layer on top of the clay was about 6 inches thick.

Feature No. 6.—At a depth of 3.7 feet there was found a fire basin 3.2 feet by 4.5 feet made of hard burned clay. Shell that was close to the basin showed no effect of fire. Adjacent to this fire basin was a rock covered pit in which there was a burial. The fire basin was on the same level as the burial pit but precedent to it.

Feature No. 7.—At a depth of 4.6 feet in square 135R3 was found an ash bed circular in form with a diameter of 3.6 feet. This bed was made of a clean light ash. It was lenticular in cross section, and 0.5 foot thick at the center. There was a shallow basin below the ash.

Feature No. 8.—This was a pile of burned rock which was mostly river pebbles. It was 2.5 feet deep in square 150L3. Fourteen rocks from 3 to 6 inches in size constituted the pile. All show evidence of burning in situ and many were cracked by fire. There was some ash and burned shell beneath the stones, but there was no fire basin or pit. This feature is shown in plate 143, figure 1.

This type of association of fire and river pebbles suggests another technique in the consumption of shellfish. A fire was built on any small area floored by river pebbles. When the pebbles were very hot, the fire was swept away leaving the ashes under and between the pebbles. Shellfish were then dumped onto this bed of hot rocks. Enough of the liquid content of the mussels in contact with the hot stones would be released so that in falling on the hot stone a great volume of steam would be produced. This steam in rising through the pile of mussels would partially cook them and make them ready for eating. Dr. Morrison, of the division of mollusks of the United States National Museum, stated that shellfish subjected to such a flow of steam could be cooked in 20 seconds.

This process would account for the finding of small areas floored with river pebbles. Within these areas, ashes were found under and between the pebbles. Many of the pebbles were cracked by sudden cooling. Also, the occasional finding of many paired bivalves lying undisturbed on such a bed of river pebbles would indicate that in such cases the number of mussels cooked was in excess of the demand for immediate consumption.

Feature No. 11.—This was a fire basin, 1.7 feet in diameter, which was 7.6 feet below square 120L2. This basin was hard burned, and was made of puddled clay about 1 inch thick. This feature is shown in plate 136, figure 1.

Feature No. 13.—At a depth of 6 feet below square 135–0 there was a hearth cremation some 24 inches in diameter and about 2.5 feet in vertical thickness. The hearth or fire basin was lined with about 1 inch of red burned earth. This hearth was not inclusive within the mound, but it was intrusive from the old occupational level indicated at the top of zone C. At the top of this pit there was found a total cremation covered by pure shell and later appearing as if sealed with a block of pure clay. The lower portion of the pit is represented by a fine laminated varicolored deposit of shell, ash, and burned earth. This feature is shown in the longitudinal vertical section in plate 136, figure 2.

BURIALS

This site, like all shell mounds, presents a difficult problem when an attempt is made to classify the burial customs or to seek for evidence of stratigraphy in these customs. It appears that all 5 types of burials, previously discussed as occurring in shell mounds in this basin, are present here in considerable numbers. These various types at first sight seem to be so mingled throughout the shell mound that classification appears to offer little aid. However, even with this considerable diversity, the burials within any one type are quite uniform. If a single people may have been responsible for the major bulk of this great shell midden, one would naturally seek a reason for such wide diversity of burial customs. It has not been possible to show that either age or sex has any determining influence in burial form. Very little aid is given by considering accompanying artifacts since only 33 burials out of a total of 197 had any artifacts whatever.

In seeking for evidence of stratigraphy in burial forms, one is confronted with the necessity of determining the level from which burial pits were intruded, in order to correctly assign the burial to its proper occupation level. In shell mounds, pits may easily be dug in the loose shell and then refilled with the same detritus without leaving much of any visible sign of the pit intrusion. The midden soil is very black, and when there is a heavy admixture of shells the whole mass is very loose. Such soil does not readily maintain a pit wall, and its color demarcation is often impossible to see. The investigator usually has first knowledge of a burial when it is struck. Comparatively few are revealed before the bones are uncovered. This fact should be kept in mind in studying burial stratigraphy. The level of intrusion of burials in shell middens is generally difficult to determine for two reasons. First, the burial pits in general were probably never very deep. In some cases the body was placed on the shell and loose shell was scraped up and used to cover it over without actually any pit being dug. Second, the evidence shows that there was a large amount of digging in the shell at all times by the shell-mound dwellers. This accounts for so large a number of aboriginal disturbances of burials. Even in cases where skeletons were not disturbed, the pit walls were often broken down by later aboriginal digging. It is true that the round graves were placed in definite pits, but even these were often very shallow and quite often found disturbed by aboriginal occupancy. The fact remains that it is very difficult in many cases to assign to a burial an exact level of intrusion. In spite of these difficulties, it appears that significant stratigraphy of a kind in burial forms is discernible.

During the excavation 197 burials in whole or in part were found. The results of a study of the distribution of type forms is presented below. For description of individual type forms, see reports on sites Lu° 67 and Ct° 27.

Burial summary

	No.	*Percent*
Burials of determinate type	115	58
Burials of indeterminate type	82	42
Total burials	197	100

Distribution of burials by types

		Total in type	
		No.	*Percent*
Type 1a, round grave, on side	24		
Type 1b, round grave, on back	26		
Type 1c, round grave, frog form	3	53	47
Type 2a, partially flexed, on back	18		
Type 2b, partially flexed, on face	4	22	19
Type 3a, fully extended	9		
Type 3b, extended lower legs folded	6	15	13
Type 4a, deposit of cremation	8		
Type 4b, cremation in situ	2	10	8
Type 5a, sitting posture	15	15	13
Total		115	100

Cause of failure to determine burial type

Aboriginal disturbance of burial	39
Surface disturbance, plow cultivation	6
Incomplete excavation, boundary profile	7
Loss in land slide, cave-in	1
Infants	29
Total	82

The study of the stratigraphy of burial forms at this site does not lead to the discovery of sharp lines of demarcation between different types or entire abrupt discontinuities in burial customs. However, it does seem to show that while some types were confined to certain natural zones and not found outside of these zones, yet these types were not the only forms of burial used in their respective zones. As shown in the tabulation of type forms, the round grave was by far the most numerous. It seems to have been used early in the deposit of this midden and to have been associated at one time or another with all the other types. The round grave is always a pit nearly circular in form and very close to 1 foot in depth. It is usually only large enough to contain the body which is always closely flexed in one of the three types, 1a, 1b, 1c. (See page 108, for list of types, and pls. 137, fig. 1; 139, fig. 2; and 140, fig. 2.

In recording these burials in table 11 the data on depth indicates the depth of the bottom of the pit on which the body rested. The level of intrusion, and therefore the level with which the burial is properly associated, is very closely 1 foot higher than the pit bottom recorded.

The depth distribution of this type of burial shows that they were most numerous in zone "A" which embraces the upper 6 feet of this midden.

TABLE 11.—*Depth distribution of round-grave burials*

Foot level	Type 1a	Type 1b	Type 1c	Total	Foot level	Type 1a	Type 1b	Type 1c	Total
1	4	4		8	9	0	1		1
2	4	2		6	10	0	1		1
3	5	3		8	11	1			1
4	0	6		6	12	0			0
5	4	2	2	8	13	0			0
6	2	5	1	8	14	2			2
7	0	1		1					
8	2	1		3	Total burials				53

Artifacts with this type of burial are comparatively rare; only 10 of the 53 burials had any artifacts and these were comparatively simple. Pottery was not generally used as burial offerings, however, one burial, No. 49, at a depth of 5.3 feet had a fiber-tempered pot at its feet. This is the only instance of this kind noted and the only approximately complete fiber-tempered vessel found in the entire excavations in this basin.

EXTENDED BURIALS

This type was subdivided into type 3a fully extended and type 3b extended to the knees. In this latter subtype, the lower legs were usually folded on top of the skeleton. There were 9 type-3a and 6 type-3b burials. With 1 exception, table 12 shows that these burials all are intruded from the surface of the midden and represent the makers of the shell-tempered pottery. They are often accompanied by shell-tempered pottery vessels and shell beads as noted under "remarks." Shell-tempered vessels are not found in any other type of burials. Of these 15 burials, 9 had artifacts intentionally deposited as burial furniture, and 2 others with triangular arrowpoints in their thoracic cavities may have been killed by them.

TABLE 12.—*Extended burials*

Burial No.	Depth	Square	Remarks
	Feet		
2	2	85L3	Shell-tempered pot at head.
3	2.2	85L3	Shell-tempered pot fragment, large.
11	2.3	95L3	Galena, copper earbobs, celt.
12	2.1	135L3	Shell-tempered pot, many artifacts.
28	3	125R4	Headless.
36	2.8	45R3	Shell beads, ulna awl.
70	2.7	75R2	Copper beads, many artifacts.
119	1	135R1	Triangular arrowpoints.
120	1	135R1	Triangular arrowpoint.
121	1	130R2	
122	1	130R2	
125	1.5	120L2	Shell beads, large potsherd, shell tempered.
130	1.8	125–0	
131	1	125L2	Shell-tempered pot, strap handle.
194	13	145L2	Flint point.

It thus appears that these extended burials had an average depth of 1.8 feet with the exception of burial No. 194 which was at a depth of 13 feet and was otherwise exceptional.

It would seem certain that extended burials belong generally to the upper 2 feet of zone A which is the region of maximum pottery density. In general it may be said that the grave for extended burials was quite shallow, and many had undoubtedly been disturbed by cultivation. If there had been no cultivation of this site it seems certain that the number of burials of this type would have been much greater. Where the skeleton was 2 feet deep or more, the pit wall remained, in every case, to clearly show intrusion from within the upper 2-foot level.

PARTIALLY FLEXED BURIALS

Partially flexed burials to the number of 22 were found at depths as indicated in table 13.

TABLE 13.—*Partially flexed burials*

Burial No.	Type	Depth	Square	Remarks
		Feet		
15	2b	2.4	65R4	
16	2a	2.1	120R4	
23	2a	2.5	130R3	
27	2a	3.3	85R4	
31	2b	1	40R4	
58	2b	3.3	130R3	
59	2b	2.1	130R3	
87	2a	2.2	55–0	
88	2a	3.6	60–0	
96	2a	1.4	60R1	3 flint and 1 bone projectile points, 1 rubbing stone.
102	2a	2.4	140R3	
103	2a	1.4	140R4	
106	2a	1	170R4	
127	2a	2.2	125R2	
138	2a	2.4	135L1	
139	2a	2	135–0	
141	2a	2	135–0	
160	2a	2.9	150L3	2 shell gorgets, and shell beads.
163	2a	1.1	145–0	
176	2a	1	135R2	
179	2a	2.2	145R1	
183	2a	1.2	145R2	

An inspection of this table shows that they were all in the upper 4 feet of zone A with minimum depth of 1 foot, maximum depth of 3.6 feet, and an average depth of less than 2.1 feet. Their depth distribution by foot levels may be shown as follows:

Foot level:	*Number*	Foot level—Continued.	*Number*
1	3	3	10
2	6	4	3

This would seem to indicate that the partially flexed burials were generally associated, in point of time, with the extended burials, perhaps a few inches lower on the average. They differ markedly, however, not only in form of burial but in the absence of shell-temper pottery vessels and associated artifacts. There were only 2 burials in 22 having any artifacts whatever.

SITTING POSTURE BURIALS

During the whole excavation 15 burials were designated as type 5. These were burials of a body in a sitting posture in a small vertical pit. The body was evidently placed in a sitting posture by being leaned against the vertical pit wall. The legs were drawn up, heels against the buttocks, and knees under the chin. Often stones were slipped into the pit to hold the body in this position. These pits were generally about 2½ feet deep. It is possible that they were covered with bark and then shell piled over the top. It is doubtful if these graves were filled immediately with earth since postburial slumping usually permitted the head to fall forward and reach the pelvic cavity face downward. This could hardly happen if the grave was filled with earth at the time of burial. Usually the spinal column remains in anatomical order and in position so that there is usually no mistaking this type of burial. Artifacts are often placed with the dead, but clay pottery was not so used. Such burials necessitate a pit, perhaps 2½ feet deep, which is fairly deep for shell-mound burials. The bottom of such pits would extend, therefore, somewhat below the level of occupancy with which they were associated. Such pit walls would be damaged easily by later occupancy and aboriginal digging as was found to be true in many cases. After the body slumped, it appears that the walls often gave way before the covering earth fell in, which may be another reason why it is so difficult to find the origin of the pit for these burials. Because of the nature of these burials and the changes they undergo from natural causes, it is probable that the 15 burials recognized do not represent all of this type originally made in the area excavated. In table 14, the depth reported represents the bottom of the pit on which the body rested. This type of burial is illustrated in plate 140, figures 1, 3, and 4.

TABLE 14.—*Burials in sitting posture, type 5*

Burial No.	Depth	Square	Remarks
	Feet		
25	5	60R3	Bar gorget, surface of mound much eroded.
54	6	90R3	
65	8.8	120L3	Awls, bone, bar gorget, projectile points.
66	6	90R3	
69	6.5	135R3	Animal jaws, drifts, projectile points.
75	6	90R3	(Surface much eroded.)
92	6	55L2	
105	4.7	145R4	(Shown in pl. 140, fig. 3, as typical of type 5.)
107	5.5	140R4	
113	5.5	150R4	
147	7	125L2	Infant in sandstone vessel.
148	7.7	120L2	Animal jaws, turtle carapace.
150	8	125L2	
151	8	125R1	Shell, copper artifacts.
157	7.8	120L2	

Considering the "depths" as recorded, their distribution by foot levels would be as follows:

Foot level:	*Number*
5	2
6	6
7	2
8	4
9	1

It will be noted that the maximum depth is 8.8 feet, the minimum is 4.7 feet, and the average depth is 6.57 feet. It is manifest that this type of burial has no connections with the surface of this midden. Even if we allow 2 or 2½ feet for the depth of the burial pit, the burials still fall in the lower half of zone A and in zone B. It is believed that this type of burial at this site was entirely prepottery as the term is usually used. In these burial pits not a single potsherd of any kind was found. However, as indicated, burial 147—an infant burial at a depth of 7 feet in zone B—was found sitting up in a large sandstone vessel. This vessel is shown restored in plate 161, figure 1. The entire absence of clay pottery sherds of every kind and the presence of this sandstone vessel seems to be significant of a prepottery-culture complex which includes 2-holed stone gorgets, horn drifts, and flint projectile points.

CREMATIONS

Nine cremations were ascertainable in the area investigated. Seven of these are believed to have been the deposit of cremated remains rather completely burned elsewhere, and two appeared to be cremation in situ. These are tabulated as to depth as follows (table 15):

TABLE 15.—*Cremations*

Burial No.	Depth	Square	Remarks
	Feet		
111	9.6	170L3	Stone beads (burned) (pl. 142, fig. 2). Burial lay on clay subsoil under eroded portion of the mound.
162	7.6	131L1	Shallow basin lined with shell.
166	11	135L2	Partial cremation (pl. 163, fig. 1).
169	10	130R3	
174	11.5	155R2	Partial cremation (pl. 163, fig. 2).
186	7.5	140-0	Cremation in situ, surface of zone C.
187	7.5	140-0	Do.
188	7.5	140L1	
191	7.8	135-0	Partial cremation.
197	10	135L2	Do.

Such burials consist of burned fragmentary bones which were either burned in situ or deposited where found. The cultural level to which they should be ascribed is clearly that level at which they are found. The depth distribution of these ten cremations is as follows:

Foot level:	*Number*
8	5
9	1
10	2
11	1
12	1

It thus appears that five—half of the small number of cremations found—lie within zone C, and the others are still lower. No cremation was found above zone C. These burials are, therefore, clearly prepottery and represent one of the oldest types of burial practice at this site.

The fact that most of these cremated bodies were burned elsewhere and only the remains were brought to the shell mound for deposit may explain why there are practically no burials of any kind in the shell midden below the 11-foot level. It leads to the suggestion that in the early stages of the midden cremation was the rule and dominant practice, but that the gathering up of cremated remains and their redeposit in the shell may have been a comparatively late acquired trait.

Figure 30, with bar charts, is an attempt to present these conclusions as to the distribution of burial types. In the chart, type-5 burials have been arbitrarily elevated 1 foot in an attempt to place these burials somewhat more exactly at their relative level. As has been explained, the burial pits in type 5 are 2 feet deep or deeper, while in types 1, 2, and 3 the burial pit is rarely more than 1 foot deep and in type 4 there is usually no pit at all.

It appears from this chart that there does exist a type of stratigraphy in burial form in this site which may be associated with a stratigraphy of other cultural traits. The boundaries of these strata are not as exact and definite as one might wish. Obviously, if the number of burials had been larger the conclusions would rest on a better basis. It is a matter of regret that so many burials—83, or

42 percent of the total—were so disturbed or otherwise rendered unavailable for this study. However, the conclusions drawn rest only on those burials of which the type certainly could be determined. It is little short of astonishing that stratigraphy of any sort could be found in view of the manner in which shell middens accumulate by slow accretions which were irregularly scattered on the surface and in view of the relatively large amount of aboriginal digging into these refuse heaps. It is possible to find stratigraphy only because of the large area investigated and the very large bulk of material removed.

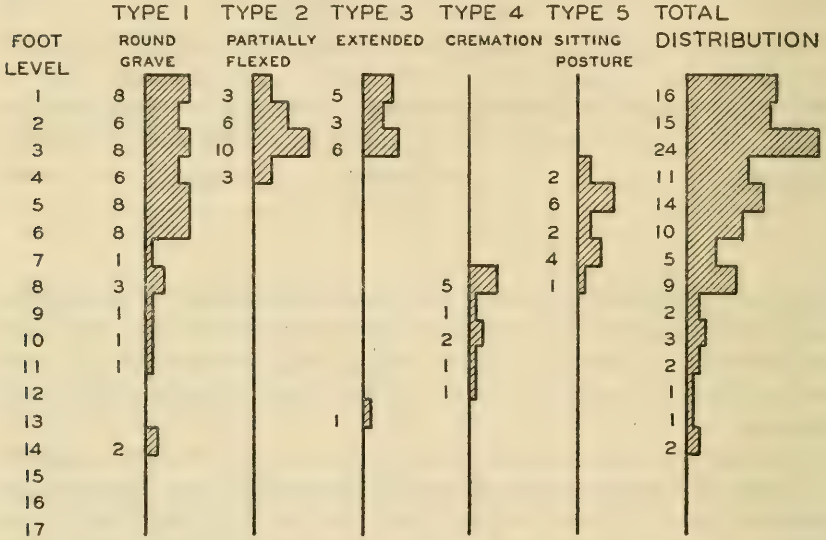


Figure 30.—Depth distribution of burial type forms, site Lu° 59.

This should emphasize the importance of this stratigraphy which has persisted in the face of all the agencies which tend to confuse and mar the record.

List of Burials

Only those burials which had artifacts or other significant associations have been chosen for special description.

Burial No. 2.—This burial, type 3b, was found at a depth of 2 feet in square 85L3. At the left side of the skull was a shell-tempered pottery bowl (pl. 160, fig. 1). This burial appeared to have been intruded from the surface.

Burial No. 11.—This extended burial, type 3a, lay 2.3 feet below stake 95L4. It was near the profile on the L4 cut made through the shell, and after the profile had stood for some time, the burial was revealed by a cave-in due to heavy fall rains. Under the skull was a huge potsherd of some 10½-inches maximum dimension. This sherd was shell tempered and lay concave side up. It was plain on the outer surface, but had a 4-lobed lug on the rim. Its curvature indicated a vessel of utility, a true pot of 16 inches in diameter. This vessel is shown restored by drawing in plate 164, figure 2. On the sherd, lay a lump of galena, a small greenstone celt, and a long bone awl. Shell beads were scattered near the chin, and close beside the skull were ear ornaments, one on each side. These were thin copper plates, embossed, and covering wooden disks of the same size. All of these artifacts are shown in association in plate 153, figure 2. This was definitely an intrusive burial, as the walls of the pit could be made out extending to the mound surface.

Burial No. 12.—This type-3b burial was 2.1 feet below stake 135L3. At the head was a shell-tempered pot with loop handles. This pot is shown in plate 160, figure 2. The lower portion of this skeleton, evidently that of a female, is shown in plate 141, figure 1. Between the femora is to be seen the skeleton of a new-born infant. The position of the two skeletons suggests the possibility of a posthumous birth. This burial also appears as an intrusion from the surface.

Burial No. 25.—This type-5 burial was at a depth of 5 feet below stake 60R3 and was notable only in that with it was found one half of a greenstone bar gorget.

Burial No. 36.—This burial of type 3a was 2.8 feet below stake 45R3. It was an infant and was accompanied by an ulna awl, some small shell beads, an ospenis of a carnivore, and an ospenis of *Procyon lotor.*

Burial No. 39.—This burial was of type 1a at a depth of 1.9 feet below stake 40R4. With it were two antler drifts and a netting needle made from a bird bone.

Burial No. 45.—This was a burial of type 1c 5 feet below stake 85R3. This "frog" type of burial was definitely inclusive in the shell and had in the pit a cut deer astragulus, a circular perforated shell pendant, and a terrapin shell enclosing a number of mussel shells which seemed to be a different species from those to be found in the mound.

Burial No. 49.—This type 1b burial was in square 85R3 at a depth of 5.3 feet. It was an adult burial, and with it was a fiber-tempered pot which had been crushed, as shown in plate 137, figure 2. This burial was closely associated with burial Nos. 43 and 50 which seemed to have no artifacts with them.

Burial No. 60.—This burial of type 1b was 6 feet below stake 30–0. This adult burial was found headless, as shown in plate 139, figure 2. Accompanying the skeleton were seven very unusual awls. Five were made from human bones, some of which are shown in plate 153, figure 1, and later to be described. Also with this skeleton there was a large number of human teeth notched or perforated for suspension.

About 50 of these teeth were in a small cache between the elbows, and the others were scattered about near the cervical vertebrae. If this collector of human teeth was a professional dentist in prehistoric times we might infer that these very unusual awls were his professional tools. With these teeth was also a jaw of a fox.

Burial No. 66.—This burial in sitting posture, type 5a, was in a well-defined pit 6 feet below stake 90R3. It had suffered postburial slumping, as is common to this type. With it were found one beaver incisor, three bone awls, four projectile points, one two-holed stone gorget, and one fragment of gorget. These are shown in plate 152, figure 1.

Burial No. 70.—This burial was exposed and partially disturbed by a cave-in of the profile. It was probably of type 3a and was at a depth of 2.7 feet below stake 75R2. It was definitely intrusive from the surface. In association were two projectile points, a cut wolf jaw, a large limestone celt, a bone awl, copper beads under the chin, and a few beads within the cranial cavity.

Burial No. 75.—This burial of type 5a was 6 feet below stake 90R3. It is shown in plate 138. It was unusual because of the large number of burial inclusions. Some 33 field specimens were listed. These included 4 horn drifts, 8 bone awls, 16 animal jaws, 3 flint projectile points, 1 shell gorget, and a cache of seed pods fairly well preserved. A number of these specimens are shown in plate 147, figure 2.

Burial No. 78.—This burial of type 1b was 2.7 feet below stake 40L1. A turtle carapace and shell beads were placed at the feet.

Burial No. 81.—This type-1b burial was 2 feet below stake 45R2. With it were two bone awls, five projectile points, two baculae of raccoon, one cut animal jaw, and one bone projectile point. All these are shown in upper half of plate 151, figure 2.

Burial No. 86.—This was a type-1b burial, 3.5 feet below stake 50R1. It is shown in plate 141, figure 2. With this skeleton were seven bone awls, six flint projectile points, one flint knife, and one beaver incisor. Some of these are shown in plate 151, figure 1.

Burial No. 91.—This headless burial, extended on the back, had the lower limbs bent inward and crossed as shown in plate 137, figure 3. It perhaps might be classed as type 3b. However, it could well have been a type-5a burial which before complete disarticulation had been allowed to settle horizontally. That it had suffered some postburial disturbance is evident, for beside being headless, portions of the lower arms were entirely missing. It was found 4.7 feet below stake 60R1. With it were a bone awl, an ulna awl, one flint drill, two flint projectile points, an animal jaw, and the pelvis bone of an infant. This last may be a chance inclusion in the pit fill.

Burial No. 96.—This burial, type 2a, was only 1.4 feet below stake 60R1. With it were three potsherds, three projectile point tips, one rubbing stone, and a bone projectile point.

Burial No. 105.—This type-5a burial was found 4.7 feet below stake 145R4. It had no artifacts in association but is selected for description and presentation in plate 140, figure 3, because it is such a good example of this type. While postburial deformation is apparent here, there has been so little that the skeleton was largely still in anatomical order. The pit walls were easily identified. This pit had been dug through a hard-burned, compact, and clean ash bed which was evidently an accumulation of ash from fires in situ. The pit extended through the ash layer and to a depth of a foot or more below.

Burial No. 111.—This was a cremation, a type-4a burial, shown in plate 142, figure 2. It was 9.6 feet below stake 170L3. The burned bones rested directly on the original humus at this point. There is no evidence of burning in situ. The bone fragments were restricted to an area about a foot in diameter. The stone beads were evidently also burned at the same time as the body. Nearly all skeletal parts were represented in some measure.

Burials Nos. 119, 120, 121, 122, and 123.—At a depth of about 1 foot in squares 130R1, 130R2, 135R1, and 135R2 were four adult burials and burial No. 123, which was an infant. Nos. 119 and 120 were fully extended side by side, as shown in plate 142, figure 1. In the thoracic cavity of each was a triangular arrowpoint. The infant burial No. 121 was under the feet of burial No. 120. Burial Nos. 123 and 122, with the lower limbs flexed, were type 3b. All five burials had evidently been made at the same time, and all were intrusive from the surface.

Burial No. 125.—This was a disturbed burial, type 3a, at a depth of 1.5 feet below stake 120L2. At the head was a large potsherd and at the right side were a number of barrel-shaped shell beads. This was an intrusive burial from the surface.

Burial No. 131.—This was a type-3a burial of an adolescent in square 125L2 at a depth of about 1.5 feet, as shown in plate 139, figure 1. At the right side of the head was a shell-tempered pot with nine strap handles, shown in plate 154, figure 2, and also a large shell-tempered potsherd with a strap handle on the rim.

Burial No. 136.—This was an infant burial 4 feet below stake 130L2. This burial had been slightly disturbed by aboriginal digging. With the skeleton were found five barrel-shaped shell beads of large size.

Burial No. 147.—This was a burial of an infant 7 feet below stake 125L2. The small body with legs crossed had been placed in a sitting posture inside a large heavy sandstone bowl. The small body had slumped slightly, and the bowl had been broken into many pieces by the weight of the earth, but the nature of the burial was clearly evident. This burial was inclusive in the mound, as no pit was observable and was at a depth of 7 feet below stake 125L2. The restored sandstone vessel is shown in plate 161, figure 1. The exterior surface showing chisel marks is presented in plate 161, figure 2.

Burial No. 150.—This burial, of type 5a, was 8 feet below stake 125L2. In the same pit were two carapaces of the snapper turtle, two large sections of antler, animal jaw, and a string of small disk shell beads.

Burial No. 153.—This burial of type 1b was 4.5 feet below stake 130R1. With it was a drilled stone gorget.

Burial No. 155.—This burial was of type 1a at a depth of 8 feet below stake 125–0. While it had no artifacts it was so unusual as to deserve special description. The grave pit, only large enough to receive the completely flexed body, had been lined with clay. The clay had been burned hard, and some ashes remained in the pit. The body had then been put in and coiled into the pit, which was an oval 1.9 feet by 1.4 feet.

Burial No. 157.—This burial, of type 5a, was 7.8 feet below stake 120L2. The body had been placed in a sitting posture in a pit which was irregularly lined with red burned clay. Two river pebbles were found against the pit wall. These may have been used to support the body in the pit. As usual, the skull had fallen forward and rested inverted in the pelvic cavity. With the body were shell beads, a shell pendant, and a mass of sheet copper.

Burial No. 160.—This type-2a burial was 2.9 feet below stake 150L3. With it were two shell gorgets, shown in the lower half of plate 151, figure 2, and a string of shell beads.

Burial No. 164.—This type-1a burial was 8 feet below stake 135L1. With it at the neck were three very large shell columella beads.

Burial No. 165.—This type-1c burial was 5.4 feet below stake 135L2. With it was an awl made from the cannon bone of deer.

Burial No. 166.—This burial was a deposit of a partially cremated body. In the immediate center of the burial was a large conch shell which contained the calcined fragments of the skull. This burial is shown in plate 163, figure 1. It may be noted that the vertebrae remained comparatively articulated, but the legs and arm bones were absent. The surrounding earth was not burned, and there was no evidence of fire at the point of burial. The conch shell had not been burned. This would seem to indicate that this partial burning of the body took place elsewhere and that when burial took place much of the body remained in anatomical order.

Burial No. 170.—This infant burial was 11.2 feet below stake 160L2. The bones were very fragmentary, and with them were long perforated cylindrical shell beads and drilled cylindrical stone beads of jasper.

Burial No. 174.—This was a deposit of cremated remains. The burial is shown in plate 163, figure 2. This burial was 11.5 feet below stake 155R2. It will be noted that a portion of the vertebrae remains in anatomical order. The limbs are absent. The earth about the burial is not discolored by fire. This burial would seem to indicate a very partial and incomplete burning of this body and a very careless gathering up of the fragments for deposit in the shell midden.

Burial No. 177.—This infant burial was 1 foot below stake 150R1. The bones were quite fragmentary. With it were two shell pendants.

Burial No. 186.—This burial was a total cremation exposed in the vertical profile on the 130-foot cut. The pit, which was lined with burned red clay, is indicated by a white string in plate 164, figure 1. The horizontal string sections mark the base of zone B. The burial is therefore clearly intrusive from zone B.

Burial No. 194.—This type-3a burial was at a depth of 17 feet in square 150L1. It was intruded from zone "G" into zone "H." With it was a single flint projectile point definitely in association.

STRATIGRAPHY IN FLINT

The boundaries of the natural zones A to H inclusive, as shown in plate 144, figure 1, were so distinct that it was felt this site should be expected to present definite stratigraphy. While to some extent this was true, yet as related to flint artifacts, the type of stratigraphy discovered permits relatively few certain conclusions to be drawn. The number of flint specimens recovered was not large in proportion to the amount of midden excavated. The depth-distribution study of flint was undertaken on material taken from cuts 165, 170–175, 125–130, the L3 cut beyond the 125-foot profile, and the "block" as shown on the ground plan of the excavations, figure 23. This area comprised sixty 5-foot squares. These were all taken down by 6-inch levels and yielded 852 specimens of worked flint. These were arbitrarily classified according to the system previously set up for other sites of Pickwick Basin. Figure 31 shows the depth distribution of these 852 specimens. The bar chart shows graphically that about 3 feet of shell midden was laid down before flint came to be used on this site Flint does not make its appearance in connection with a shop site on this mound, but in the 14-foot level a few simple points appear. These increase gradually in number up to the 11-foot level, when suddenly the use of flint was more than doubled. It remained at about that value up to the 6-foot level. At this level (the bottom of zone A which contained all the pottery) the use of flint dropped off slightly but continued at the reduced value up to the 2-foot level where its use more than doubled again in levels 1 and 2.

When this flint complex is broken down into individual types, there seems to be very little significance to stratigraphy. Each type seems to have had its origin well down in the midden deposit and to have continued to the top. This is well illustrated in figure 32, which presents the depth distribution of a number of dominant types. It will be observed in the chart of each type that there is a definite tendency to discontinue the use of each type at about the 5- to 7-foot level. For most of the very specialized forms there seems to have been a zone at about the 6-foot level which was nearly sterile of flint except the cruder forms. This zone has other artifacts in quantity. This diminution of flint is apparent in this zone in all types presented in figure 32 except type 23 which is a crude large knife or scraper. This seems to have first appeared in the 15-foot level and to have increased gradually to the top where it was a maximum. The continuance of each type, from its origin into and throughout the pottery zone, seems to argue a cultural development of a single people, who, having no pottery in their early history, took on the use of pottery and continued to use the same types of flint while so doing. Type forms are shown in plate 158, figure 2, and plate 159.

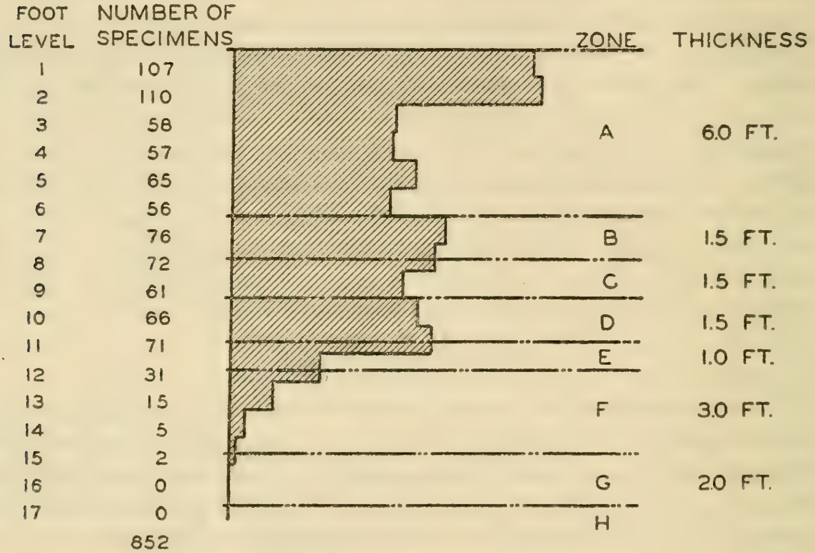


FIGURE 31.—The total flint complex, site Lu° 59.

These came from the general excavation of the midden material. The types most commonly found in association with burials were types 6 and 58.

Plate 151, figure 1, shows five specimens of type 6 taken from burial No. 86, and pl. 151, figure 2 shows four similar ones from burial No. 81.

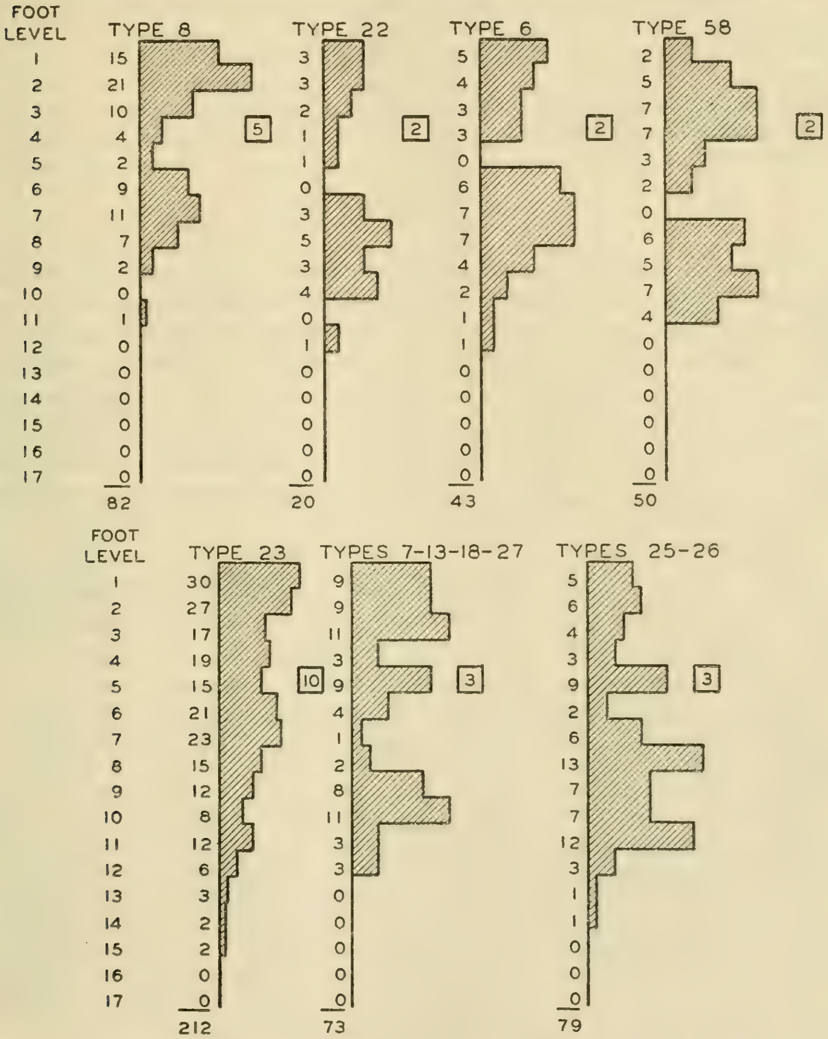


FIGURE 32.—Depth distribution of dominant flint types, site Lu° 59.

Type 58 is shown in plate 152, figure 2, upper left. These two specimens were taken from burial No. 75, and plate 152, figure 1, shows three specimens of type 58 taken from burial No. 66.

GROUND STONE ARTIFACTS

Beside the 852 specimens of flint, there were 41 stone field specimens as follows:

Summary of stone field specimens

Stone gorgets, 2-holed	15
Celts	12
Bow drill sockets	3
Pestles	3
Boat-stones	1
Beads, barrel-shaped (jasper)	5
Grooved axes	2
Total	41

Plate 150, figure 2, shows two grooved axes taken from the general digging; the one on the right being a granite 5.25 by 3.6 inches in size. The small hand hoe shown in the same figure was made of sandstone. The pestles were found in the general midden debris; the longest being 5.4 inches long, and all belonging to zone A. Celts were not very common and were found generally with burials. Plate 152, figure 2, shows a round-pointed pole celt 7.5 inches by 3 inches in size. Another celt, square poled, made of greenstone, was found with burial No. 11, as shown in plate 153, figure 2.

Fifteen 2-holed bar gorgets of the flat bar form, usually broken, were found. Plate 150, figure 1, shows a number of these broken specimens. Plate 152, figure 1, also presents two gorgets found with burial No. 66. The oval gorget of chert was 4.25 inches long by 2.1 inches wide. The other specimen was of black slate. Of these stone gorgets, two were from disturbed placement, six are of definite placement with burials, and the balance were from the general digging. All are from zone A, not deeper than 6 feet.

The only boat-stone found in the excavation is shown in plate 150, figure 1. It was of green serpentine 3.25 inches long, 1.75 inches wide, and 1.5 inches deep. This same figure presents three bow drill sockets. The one on the extreme right was taken from burial No. 185, and the one on the extreme left was taken from burial No. 17. In this figure is also shown one large red-jasper bead taken from burial No. 128 at a depth of 13 feet. A total of five jasper beads were found; all were with burials, and all at least 8 feet deep or deeper.

COPPER ARTIFACTS

Copper artifacts occurred in only two instances. Both were with burials which were shallow and intrusive from the surface and therefore late in the history of this midden. Burial No. 70 had a string of some 10 or more cylindrical copper beads, as shown in plate 152, figure 2. This burial was at a depth of 2.7 feet. Burial No. 11 at a depth of 2.3 feet had two copper ear ornaments. These were made of thin disks of copper; each were embossed with two concentric circles and laid over wooden disks 1¾ inches in diameter. These are well shown in plate 153, figure 2, together with associated artifacts.

BONE AND HORN ARTIFACTS

Of the 1,668 objects listed as "field specimens," the great majority 1,485, were artifacts of bone and horn as shown by the following tabulation.

Tabulation of bone field specimens

Bone projectile points	511
Cylindrical needle awls	363
Bone needles carved and polished	45
Split bone or splinter awls	260
Deer ulna awls	64
Bird bone awls	28
Cut and worked antler	100
Antler drifts	42
Cut or worked animal jaws	27
Antler awls	13
Miscellaneous awls of bone	15
Atlatls, antler	4
Bone pendants	5
Human bone awls	5
Fishhook	3
Total	1, 485

Bone was worked into long awls or needles to make 408 specimens so perfectly that it was difficult to tell with certainty the source of the bone. Less well finished awls were classed as bone splinter awls. Deer ulna awls and bird bone awl are illustrated in plate 148, figure 1. While the tarsometatarsal of wild turkey were sometimes used in burial association, as shown in plate 147, figure 2, the leg bones of large waterfowl, the loon (*Gavia immer*), were used as awls, as shown in plate 148, figure 1. These were sometimes in burial association but often in the debris about fire hearths.

Plate 148, figure 1, presents a number of types of awls. The awl 7¾ inches long, decorated with notches on the side, was taken from burial No. 86 as shown in plate 141, figure 2. Leg and toe bones of deer were cut squarely off at one end and reamed out to form what seems to be a hollow handle; some of these are shown in plate 147, figure 1. Antler was cut into sections from 2 to 5 inches long and ground to blunt ends. These are classed as antler "drifts"; typical forms are shown in plate 147. In the lower row of plate 147, figure 1, from the left may be seen two "shaft straighteners," a bodkin or incipient fishhook, and various types of projectile points made from antler tips. The depth distribution of bone and horn artifacts is shown in the following table (16), the data for which was taken from selected cuts showing the least erosion or disturbance:

TABLE 16.—*Depth distribution of bone and antler artifacts*

Foot level	Bone needles	Bone awls	Splinter awls	Ulna awls	Cut antler	Antler drifts	Antler points	Total bone specimens
1		22	19	8	16	4	1	70
2	4	27	33	3	8	2	2	79
3		25	21	5	3	1	1	56
4		5	3	2	4	2		16
5	2	17	12	3	7	2	3	36
6		17	14	1	2			34
7	5	7	14	2	1		1	30
8	2	19	8	4	3	2	1	39
9	3	17	19	4	1	3	1	48
10		7	7	6	5	1		26
11	1	9	3	3	2		1	19
12	4	6	2	0	1		2	15
13		5		1	2			8
14		1			4			5
15								
16								
17								
Total								481

A most unusual group of bone awls are shown in plate 153, figure 1. These were all in association with burial No. 60. This headless burial is shown in plate 139, figure 2. The group of awls consisted of one ulna awl from a carnivore, one tarsometatarsal awl from a wild turkey, one human radius awl 8 inches long, and four human fibulae awls, the longest being 14 inches. With these awls there were 131 human teeth. Thirty-four were drilled for suspension; 33 of which are shown in plate 153, figure 1. Ninety-seven were grooved for suspension, 29 of which are also shown in plate 153, figure 1. The placement of these human teeth in the grave indicated that they were suspended on a continuous string. One is tempted to wonder if in life this individual was a prehistoric dentist, and these human teeth the insignia of his profession. If so, perhaps these awls of human fibulae and radius were the tools of his profession. It is difficult to see how they could have been particularly useful in his work, but if the extraction of teeth was as crudely performed as such tools would suggest, it may be easy to understand why this individual was headless when buried. These awls are certainly of rare form and very well made.

Of all the bone and horn implements found in most shell middens in the basin, most interest attaches to the bone projectile points and horn hooks or atlatls.

These bone projectile points are made by nonsymmetrically grinding a splinter of hard bone from 3 to 4.5 inches long. Usually a long bone such as the cannon bone of deer is split longitudinally, and a section which contains a sharp corner is taken. This is so worked into form that its cross section at its midpoint would be nearly triangular. The interior surface of the bone remains as a longitudinal groove. One end of the projectile is scraped to a blunt but sharp point while the other end is left gradually tapering to a rounded unfinished end. These points often show battering as if they had struck some hard object while in flight. Bone projectile points to the number of 511 were found in this excavation. Specimens shown in plate 148, figure 2, indicate the range of variation in size and shape. A few have been hardened on the point by fire, whether intentionally or unintentionally is not known.

Because the bone projectile point was so characteristic and quite numerous, special effort was made to study its depth distribution in squares which showed a minimum of disturbance. Figure 29, with bar chart, shows the distribution of 88 specimens taken very carefully from "the block" in the excavation and also specimens from the other section of the mound. It seems apparent that this bone artifact is largely centered in zone A, as shown by the distribution in "the block." Some of those specimens appearing below the 6-foot level may well have reached these depths by natural infiltration due to disturbance. A few found at the lower depths may have reached such destination by the simple accident of falling from a vertical profile on to a lower cut during excavation. In view of the many agencies at work in shell mounds to obscure the record, wisdom would indicate that but little importance is to be attached to those specimens of bone points found below the A zone.

Plate 149, figure 1, presents four horn hooks, of a type so far found only at this site. These antler sections have been scraped and polished, and the basal end hollowed with a conical reamer. Three of these have had the distal end of the antler section worked into conical form and then the horn tip cut squarely off. Along the side of the section, below this truncated conical end, one side of the horn is ground to a flat surface. The conical end then has a hook worked into its base, and a longitudinal groove is cut in the flat face of the horn section. It is believed that these horn hooks were attached to "throwing sticks"; the hook was used to hold the base of the shaft to be thrown, and the longitudinal groove assisted in the same purpose. Such a wooden throwing stick with horn hook constituted a development of the atlatl at this site. It is believed simple forms were in use during the whole history of the deposit of this midden. The longest of the horn hooks in plate 149, figure 1, is 4¾ inches long. This is not its entire length since it is obviously broken. The diameter of the cone at the end is ½ inch and the length of the long tip is ⅝ inch. All three specimens of this type of horn hook were found within the upper 2 feet of midden deposit—one was with a burial, No. 81. The specimen shown on the left in plate 149, figure 1, is a much more delicately worked hook, and was taken from the 11-foot level in the general digging.

SHELL ARTIFACTS

There was very little evidence of the working of shell at this site. Perhaps because it was so common it was not held in high esteem. Plate 149, figure 2, shows a variety of beads associated with these burials. Two small shell gorgets were found with burial No. 160 as shown in plate 151, figure 2, and a single gorget 4⅛ inches in diameter was found with burial No. 75, as shown in plate 152, figure 2. The small amount of shell material seems mostly to belong to burials near the surface and probably is largely intrusive. The use of shell for ornamentation in the early history of the mound seems nonexistent.

POTTERY

Approximately 5,000 sherds were found in the general excavation at this site. Those selected for classification and study of distribution, a total of 1,326 sherds, were taken from cuts 125 to 155, L2 to R2 inclusive, which included the central block. This selection was made since it appeared that the natural zones in this portion of the mound were most nearly horizontal and the shell in these cuts had suffered less slipping, and erosion. It was felt that if any stratigraphy existed this area would be best able to show it. It was cut down in 6-inch levels in 5-foot squares. This area covered thirty-two 5-foot squares most of which had been separated from the rest of the mound by trenching about the central block. The chance of sherds falling out of higher profiles to levels where they did not belong and thus "fogging" the record was reduced to a minimum. This area was investigated in the summer because at that time the shell midden was dry, and sherds would show in the shell more easily. In dry weather there was also less chance of landslides or cave-ins producing discontinuities in the record. It was found that all the pottery lay in zone A, as shown in plate 144, figure 1. This zone was 6 feet deep and easily separated from zone B. Not a single sherd was found below this 6-foot level although the midden was about 17 feet deep at this point.

All five of the ceramic types common to Pickwick Basin and classified as to temper were found at this site. No sherd was found which did not readily fall into one or the other of these types. The distribution of these 1,326 sherds into types may be tabulated as follows:

TABLE 17.—*Relative frequency of ceramic tempers*

Type	Temper	Number of sherds	Percent
No. 1	Fiber	657	49.6
No. 2	Sand	88	6.6
No. 3	Limestone	275	20.8
No. 4	Clay-grit	185	13.9
No. 5	Shell	121	9.1
Total		1,326	100.0

It appears that some of these types are much more numerous than others and have quite a different distribution as to depth. Figure 33 shows the relative depth distribution of the total pottery complex. It is apparent that while pottery began about the bottom of zone A at a depth of 6 feet and continued to the top of the mound, its use was relatively slight during the building of the first 4 feet of zone A. At the 2-foot level, the use of pottery suddenly increased to 3.5 times its former use, and by the time the 1-foot level was laid down its use had again more than doubled. This rather astonishing development may be due to marked changes in sedentation taking place in the life of the shell-mound dwellers at this level. Perhaps a change in the food supply or in the method of preparation of food made a greater supply of pottery necessary. However, this sudden increase in the amount of pottery used is also accompanied by the appearance in quantity of new types not previously used below the 2-foot level. This would seem to suggest effective contacts with other pottery-making peoples who could supply new techniques of manufacture which resulted in new ceramic types.

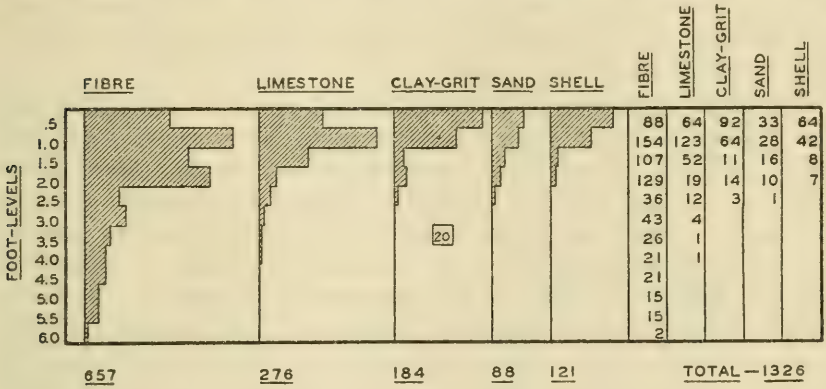


FIGURE 33.—Distribution of potsherds by half-foot levels, site Lu° 59.

Figure 33 shows the depth distribution of all five ceramic wares found at this site. The bar charts accompanying this table present a picture of the development of each ware with time.

Fiber-tempered, type-1, ware is thus seen to have been most used, and to have been the first type developed at this site. It began to be used at about the bottom of zone A, a depth of 6 feet, and during the building of the first 4 feet of zone A it was practically the only type used, as only an insignificant amount of limestone-tempered ware, type 3, was found in the 2.5-foot level. The fiber-tempered ware is usually a thick-walled sherd, which gives the general impression of crudeness and poor technique. Its inefficiency as a cooking vessel may in part explain its slow development in quantity on this site. The fact that fiber-tempered pottery was the first used at this site and that it was the only type used below the 3-foot level is further demonstrated by the finding of a fiber-tempered bowl with straight sides used as a burial offering with burial No. 49 at a depth of 5.2 feet, shown restored in plate 154, figure 1. This was the only instance of a deep burial having pottery as burial furniture. The use of shell-tempered pottery is common in very shallow graves which are usually within about 1 foot of the surface.

It is to be noted that while fiber-tempered pottery began first and had a rapid increase in use at the 2-foot level, it reached its maximum use in the lower half of the 1-foot level, but in the upper half of the 1-foot level it had begun to decline in relative importance. Perhaps this was because it was being superceded by other types. It appears by reference to figure 33 that the second type of ware to appear at this site was type 3, crushed limestone-tempered pottery. At about the 3-foot level its very slight use began, and then increased rapidly to the 1-foot level. In the lower half of the 1-foot level limestone-tempered pottery was almost as much used as the fiber-tempered ware. It also decreased in use in the upper half of the 1-foot level.

The other three wares—clay-grit, shell, and sand, in the order of their importance—all began about the 2-foot level and increased rapidly to the surface. It is apparent that all three of these types were late comers to this site, and the sand and the clay-grit in themselves offered no definite proof that they were "natives." It may well be that the sherds of these two types represent importations, the result of river-borne trade and travel. No complete vessel of either of these two types has been found at the site, and no evidence has been found of their association with any burial.

The shell-tempered ware is evidently the very last to make its appearance in this complex. No shell-tempered sherd has been found below the 2-foot level. It is most numerous on the mound surface and in the first one-half-foot level. Shell-tempered vessels are often found in association with the extended burials in very shallow graves which surely must represent the very last inhabitants at this site. The fact that shell-tempered vessels were often found in shallow graves casts a doubt on the placement of the few sherds found in the 1.5-

and 2-foot levels. They may indeed have reached that depth only as the result of digging in connection with burials. In this case the shell-tempered ware may properly be regarded as belonging to only the upper foot of midden at this site.

It is interesting to note here that the decorative designs found at this site follow definitely the temper with which they are always found associated in sites of this basin. There are no "cross-overs" of design and temper. This seems to indicate that each temper type is a "pure" ware. That is, if one might assume an organic development of ceramics at this site to include all five types of ware, it would be expected that "cross-overs" of design on tempers would occur. The absence of "cross-overs" would seem to indicate that each type of ware found here had its own separate development in perhaps its native habitat, and that the pottery complex at this site represents a development of fiber-tempered ware over a long period. During the later portion of this period, sand-, limestone-, and clay-grit-tempered wares were procured in small quantities, and finally a new and later people brought with them the exclusive use of shell-tempered pottery. The extent to which the five types of ware present the various decorative subtypes, as determined generally for Pickwick Basin, are shown in table 18.

TABLE 18.—*Decorative subtypes of five pottery wares*

Temper	Subtypes at site Lu° 59	Subtypes identified in Pickwick Basin	Percent
Fiber	5	7	73
Sand	7	11	63
Limestone	7	8	87
Clay-grit	7	8	87
Shell	5	5	100

The various decorative subtypes found at this site are illustrated in plates 155 to 158, figure 1, inclusive. The distribution of the subtypes with depth in each ware is shown in table 19. It does not seem possible to draw any certain conclusions as to prior origin of one subtype over the other beyond the general statement that, as would be expected, simple forms seem to appear first and are usually more numerous. From what has been suggested above—as to the possibility that sand clay-grit pottery may all be "importations"—one would hardly expect to discover significance in depth distribution of subtypes.

TABLE 19.—*Depth distribution of subtypes in each of five ceramic wares*

Foot level	Subtypes fiber-tempered ware, type 1						Total
		b	c	d	e	g	
0.5	22	19	36	9	2	0	88
1	51	20	72	1	9	1	154
1.5	30	19	48	4	6	----	107
2	40	32	50	4	3	----	129
2.5	13	13	9	0	1	----	36
3	17	14	7	5	0	----	43
3.5	18	4	4	0	0	----	26
4	27	9	3	1	2	----	42
5	16	10	3	0	1	----	30
6	----	2	----	----	----	----	2
Total	234	142	232	24	24	1	657

Foot level	Subtypes sand-tempered ware, type 2							Total
	a	b	c	d	f	g	k	
0.5	13	10	1	7	----	2	----	33
1	7	14	4	1	1	1	----	28
1.5	2	4	2	7	----	----	1	16
2	1	6	2	----	----	1	----	10
2.5	1	----	----	----	----	----	----	1
Total	24	34	9	15	1	4	1	88

Foot level	Subtypes limestone-tempered ware, type 3								Total
	a	b	c	d	e	f	g	h	
0.5	12	33	2	8	3	2	0	4	64
1	33	40	5	33	5	1	1	5	123
1.5	21	18	4	8	----	----	----	1	52
2	3	11	1	3	----	----	----	1	19
2.5	----	9	----	2	1	----	----	----	12
3	----	4	----	----	----	----	----	----	4
3.5	----	1	----	----	----	----	----	----	1
Total	69	116	12	54	9	3	1	11	275

Foot level	Subtypes clay-grit-tempered ware, type 4							Total
	a	b	c	d	e	f	g	
0.5	39	35	2	11	3	1	1	92
1	23	22	2	11	5	1	----	64
1.5	1	6	1	3	----	----	----	11
2	4	3	1	3	3	----	----	14
2.5	3	----	----	----	----	----	----	3
3	----	----	----	----	----	----	----	----
3.5	----	----	----	----	----	----	----	----
4	----	1	----	----	----	----	----	1
Total	70	67	6	28	11	2	1	185

Foot level	Subtypes shell-tempered ware, type 5					Total
	a	b	c	d	e	
0.5	49	2	2	2	9	64
1.0	39	1	2	----	----	42
1.5	8	----	----	----	----	8
2.0	7	----	----	----	----	7
Total	103	3	4	2	9	121

CONCLUSIONS

It is manifest that this site shows stratigraphy of a kind, but the significance of this stratigraphy in some cases is not as apparent as might be desired. In the generalized profile (fig. 34), which has been drawn to represent average conditions at this site, there is presented evidence of zones which seems to be indisputable.

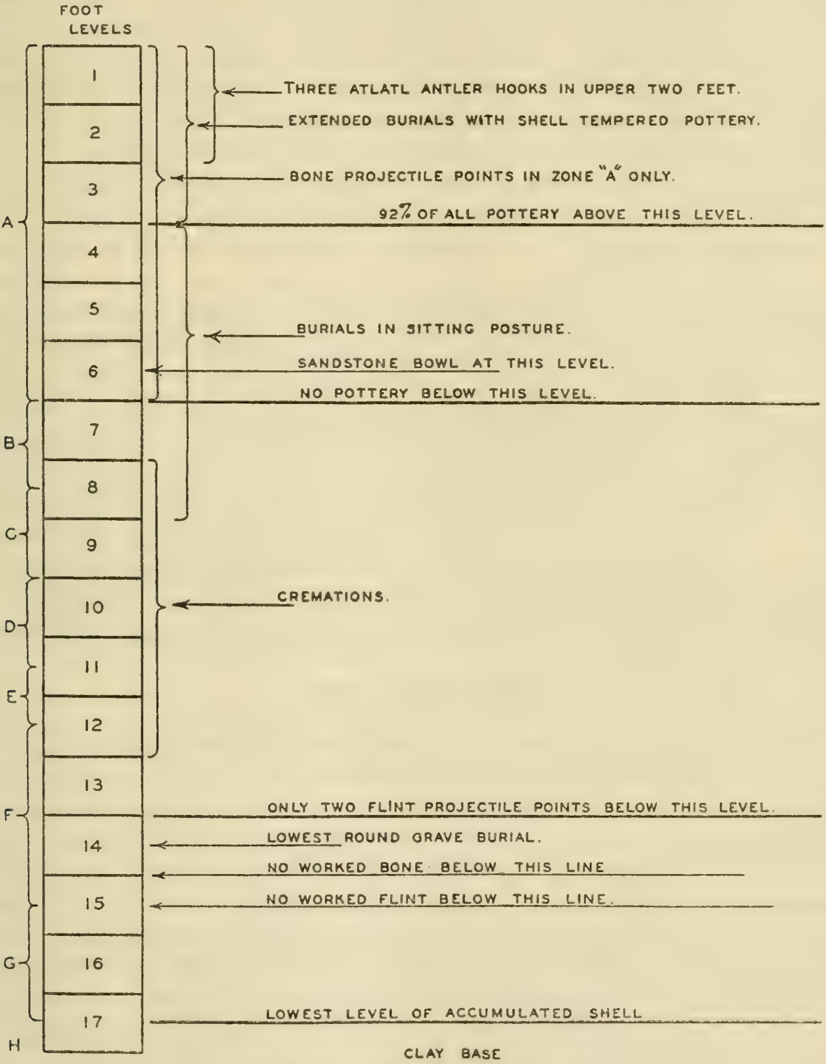

FOOT LEVELS
1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
A
B
C
D
E
F
G
H
THREE ATLATL ANTLER HOOKS IN UPPER TWO FEET.
EXTENDED BURIALS WITH SHELL TEMPERED POTTERY.
BONE PROJECTILE POINTS IN ZONE "A" ONLY.
92% OF ALL POTTERY ABOVE THIS LEVEL.
BURIALS IN SITTING POSTURE.
SANDSTONE BOWL AT THIS LEVEL.
NO POTTERY BELOW THIS LEVEL.
CREMATIONS.
ONLY TWO FLINT PROJECTILE POINTS BELOW THIS LEVEL.
LOWEST ROUND GRAVE BURIAL.
NO WORKED BONE BELOW THIS LINE
NO WORKED FLINT BELOW THIS LINE.
LOWEST LEVEL OF ACCUMULATED SHELL
CLAY BASE

FIGURE 34.—Generalized profile, site Lu° 59.

There is clearly a pottery zone about 6 feet or slightly less which corresponds to zone A. Certainly this could well have been divided into an upper 3-foot stratum which contained all five types of pottery and below this another 3-foot stratum which contained only fiber-tempered pottery.

GENERALIZED PROFILE

Zone A contains a heavy flint complex but, on the average, not as much as the region below it in the nonpottery zones. Within the pottery zone there occurs a concentration of bone projectile points which are practically nonexistent elsewhere, and also a new type of atlatl hook of antler. It has been found only at this site. It is clear that the use of bone projectile points at this site in the early stage of zone A had actually partially displaced flint projectile points. This displacement seems to have been progressive and to have continued to the time of the coming of the shell-tempered pottery people.

Clearly then there is a nonpottery zone beginning at the top of zone B at a depth of 6 feet. If, as is suspected, zone A represents a mound built upon an earlier shell ridge which is much older than the present mound, then, the large ridge extending along the river at this point may all be prepottery in construction. This nonpottery zone more than 10 feet in thickness contains all of the cremations, many round-grave burials, and many burials in sitting posture—all of which are believed to have been made by a nonpottery people. The flint artifacts were numerous and extended down to about the 13-foot level. This flint zone had a large content of bone and antler. The use of these materials seems to have begun at about the same time that the use of flint began; that is, at about the 13-foot level. It does not appear that there is a definite worked-bone zone below the flint zone at this site.

O'Neal Site, Lu° 61

This site is a shell mound on the north bank of the Tennessee River about 14 miles west and north of Florence, Ala. It is on land owned by Emmet O'Neal of Florence, and it is located in the SE¼ of the SW¼ of sec. 18, T. 2 S., R. 13 W. Site Lu° 59, also a shell mound, is about 1,000 feet to the west of this site. The accumulation of shell appeared to cover an area 270 feet N.–S. by 350 feet E.–W. This area was a large dome rising some 8 feet above the level of the surrounding fields. Within the area, the shell concentration was quite dense, although the whole region had been in cultivation for some 40 years. The actual extent of the shell was not easily determined as the shell layers dipped sharply at the edges of the exposed area. It appeared that the river terrace, upon which this shell mound was erected, had often been flooded, and the deposit of silt had covered the mound periphery. Time did not permit the digging of sufficient test pits to determine the full extent of the shell deposit, but from what was determined, it is certain that the area covered by shell is several times larger than the exposed shell area.

Before excavation was begun, an intensive search for surface material was made. A very few sherds and a small amount of flint were found. They occurred chiefly on some plowed ridges on the west portions of the mound.

In August 1937, a preliminary 5-foot trench was cut into this mound to gain some idea of the depth of the shell. Sixteen burials were discovered and numbered from 1 to 16. Shortly after this work began phenomenally heavy rains caused this 5-foot trench to cave-in badly, and a temporary labor shortage necessitated shifting this crew to another site. Work was not resumed on this site till January 1938. The original trench was abandoned and a new trench opened. Due to lack of time and the near approach of the inundation of the basin, it was not possible to use the technique formerly employed on site Lu° 59.

The mound was staked to permit a 10-foot trench to be run N.–S. from 0 stake on the north to the 270-foot stake on the south. This trench was laid upon the central and deeper portion of the shell deposit. The central line of the trench was the N.–S. zero line, and the two cuts—right and left—were thus the L1 and the R1 cuts. This trench was carried to the depths as indicated on the profile. Excavation here was particularly difficult as "cave-ins" occurred frequently in dry as well as in wet weather, and, even when the ground was frozen, high walls were not safe.

This trench penetrated to the clean, bright, sterile river clay—below the cultural accumulations—for a distance of 65 feet, from the 180-foot stake to the 245-foot stake. From the 245-foot stake to the 270-foot stake the trench went down to the water table. It was not possible to excavate below this level because of the rapid seepage of water. From the 180-foot stake northward, the trench was put down to varying depths as shown in the profile (fig. 37). There remained an estimated depth of some 3 feet of shell in the bottom of this trench from the 180-foot stake to the 0 stake, which was not removed. This excavation was in progress when a premature closing of Pickwick Dam caused a flooding of the lower basin. This drove workers from this site almost a month before the announced schedule for termination of work at this site. Conclusions as to the lower levels of the site are, therefore, limited to that portion of the trench between the 180-foot stake and the 245-foot stake.

Notwithstanding the difficulty of seepage at lower levels, the freezing and thawing of profiles, and the frequency of cave-ins, the trench was taken down in 1-foot levels very carefully. Slack dirt was regularly cleared from above the profiles and every effort was made to keep the record of depth distribution of specimens correct. Foot levels were rigorously checked, and when cave-ins occurred, the material collected was classed as debris and not considered in the depth distributions count.

By reference to figure 37, it will be noted that the profile shows the mound to be composed of zones of variable thickness consisting of humus soil, shell lenses, ashy middens, and hard pan middens—all resting on a yellow river clay which was sterile.

The humus layer is about 1.5 feet thick and covers the whole area. This soil layer is black and friable, and it contains some shell. The top portion has been disturbed by the plow. It represents the maximum depth of the root penetrations of present vegetation.

The clean shell lenses, as shown in the profile, have a tendency to dip to the southward and change in thickness. As a general condition, the lower layers of shell do not contain as much dirt and ash as the upper layers. The shell content seemed to show no definite variation in the percentage of gastropods to pelecypods in any layer. The ashy middens, which separate the various shell lenses, vary from light brown to gray in color, with a very high ash content and a considerable amount of rubble. This rubble seems to be the result of breakage of river pebbles by heat fracture. These middens also contain a considerable amount of shell, highly fragmentized. Being highly friable, they appear to have many of the characteristics of a true soil.

The zones designated as "hardpan midden" consist of a jet black clay or hardpan with a considerable amount of rubble. Because of its large clay content, when fired, it turns red. These middens contain some bone and artifacts and some shell, though not as much as the ashy middens. These hardpan middens are very hard and might easily be mistaken at times for the base of the mound except that fairly clean and compact shell layers are found below them. These hardpan midden layers, due to the large clay content, will hold a wall profile almost indefinitely under all conditions. It is not easy to determine if these clay layers are the result of river flooding or of aboriginal trucking. The surfaces are usually uneven which would hardly be produced by river flooding alone; however, their depth, density, and thickness seem to definitely suggest river deposit. The uneven surface may be attributed to aboriginal activity after flooding of the site. If this interpretation be accepted, occupancy of this site has been interrupted several times by river floods. Always, however, the resumption of occupancy resulted in another layer of shell which raised the level higher and thus diminished the chance of another overflow. The south end of the profile presents a series of alternating shell and midden layers which at the extreme southern extension of the mound is capped by a hardpan layer which may represent the last river-deposited addition to this site.

The sterile yellow clay is a tough clay which forms the undisturbed river bank of the region for many miles above and below the site. It was upon this clay bank that the first occupants of the site began the deposit of shell.

FEATURES

All special features cut by the zero profile were recorded thereon and for that reason were not given special listing. Beside these, only 17 features were separately designated. They were distributed as follows:

Gastropod lenses	3	Post molds and red-clay areas	3
Flint workshops	3	Burned-shell areas	2
Red burned-clay areas	5		—
Dog burials	1	Total	17

Of these, the flint workshops were the most interesting and are described briefly.

Feature No. 3.—This was a concentrated layer of flint chips and cores which covered an elliptical area 8 feet long and 5 feet broad in the central cut. It extended into the unexcavated L1 profile to an undetermined distance. It was at a depth of 7.5 feet below the surface and centered about stake 185–0. The flint chips were made by percussion fracture and were large and crude. There were found in the layer with the chips many cores, three flint points, and one hammerstone which showed usage.

Feature No. 7.—This was a puddled-clay area extending from stake 113–0 to stake 130–0 from L1 into the R1 profile at a depth of 3 feet. In the center was a burned area—probably a hearth—and just outside of the clay-covered area there were vertical holes which appeared to be small post molds. These were irregularly placed so that no outline of any structure could be traced.

Feature No. 15.—This was an area covered by flint chips extending from 180L1 to 190L1 at a depth of about 8 feet. The chips covered a shallow basinlike depression in the shell, and the layer was about 14 inches thick at the deepest part. With the chips were some flint cores, broken blades, and two hammerstones.

Feature No. 16.—At a depth of 5.3 feet a circular area about 4 feet in diameter was covered with chips of grey chert. This small shop site was between stakes 170–0 and 170L1.

BURIALS

Burials in this shell mound were generally found in poor condition. Decay of bones had been unusually great. This is probably due to the high-water table and the very moist condition of the lower levels of the shell. A total of 62 burials were removed from the site. This represents but a very small part of the hundreds that were evidently in this huge midden.

They were distributed as to type as follows:

Type:	*Number*
1a, round grave, flexed on side	12
1b, round grave, flexed on back	4
2a, fully flexed on side	12
3a, extended	3
5a, sitting posture	17
Disturbed	11
Infants	3
Total	62

Of these burials, 16 were excavated in August 1937 when the site was first examined. Due to excessive rains at the time, which caused trench walls to collapse and otherwise made necessary the transfer of the crew to another site, work here was not resumed till February 1938. The last excavation yielded 46 additional burials. At the site there were no cremations recognized as such. The depth distributions of burials of determinate type is shown in table 20.

TABLE 20.—*Distribution of burial types by foot levels*

Foot level	Burial type				
	1a	1b	2a	3a	5a
1	2			3	1
2	2		3		2
3			2		9
4	3	2			5
5		1			
6	1	1	2		
7	1		1		
8	3		4		
Total	12	4	12	3	17

However, even if no conclusions can be drawn as to burial customs below the 8-foot level, the extent of this excavation seems adequate to present a fair sample of conditions above that level. Certainly it may be inferred that all type-5a burials (sitting posture) were concentrated in the upper portion of this mound. The entire absence of cremations noted above may possibly be explained on the basis of failure to reach sufficient depth. Since very little of this site was excavated below 9 feet, and a considerable depth of shell remained unexamined in this portion of the last trench, as shown by the profile, this table cannot in any way be regarded as complete.

In general, artifacts were rarely placed with the burials. Of the 21 burials described below, 18 had some artifacts.

Burial No. 1.—This burial was a type-1a round-grave burial at a depth of 1.5 feet below stake 105R18. Near the head was a shale gorget.

Burial No. 20.—This burial of type-5a was only 1 foot deep at stake 35R1. It had been a sitting burial which had slumped forward and to the right side. It was found much disturbed and in poor condition. Near the head was found a bone fishhook about one-half inch long.

Burial No. 32.—This was a type-1a burial at a depth of 4 feet below stake 145–0. The body was fully flexed with a curved spinal column after the manner of round-grave burials, yet there was apparently no actual pit. The body seemed to have been laid on a very clean layer of shell and covered over with clean shell. It was thus enclosed in clean shell. This body of an adult lay on the left side with head to northeast. Near the neck was a pile of columella shell beads (fig. 35).

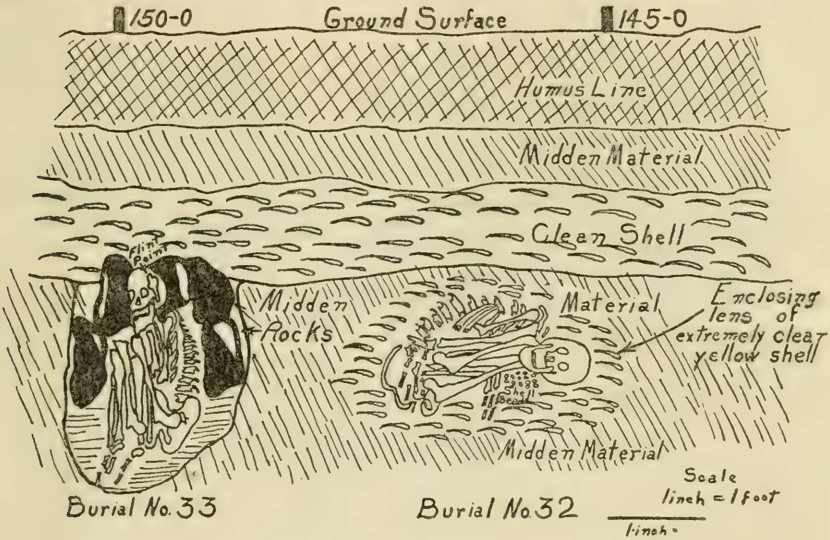

150-0
Ground Surface
145-0
Humus Line
Midden Material
Clean Shell
Flint Point
Midden Rocks
Material
Enclosing lens of extremely clear yellow shell
Shell Beads
Midden Material
Scale
1 inch = 1 foot
1 inch
Burial No. 33
Burial No 32

FIGURE 35.—Burials Nos. 32 and 33, site Lu° 61.

Burial No. 33.—This was a type-5a burial of an adult, at a depth of 5 feet below stake 150–0. The body had been placed in a sitting position in a pit, and the head and torso had been held in that position by eight large rocks which had been slipped in beside the body to wedge in between it and the pit wall. This had prevented the usual slumping in such burials, but the stones had crushed the bones badly. On the head lay a gray flint projectile point. This burial is shown by drawing with No. 32 in figure 35.

Burial No. 34.—This was a 5a-type burial at a depth of 3.7 feet in square 125–0. This burial had slumped badly, with the head as usual having fallen forward. The knees were elevated and the vertebral column remained in anatomical order. Three flint points were found in association, two of red jasper and one of gray flint.

Burial No. 37.—This was a type-5a burial 3 feet below stake 140R1. The pit outline was very distinct, and the burial was unusual in that the pit had been filled with a brown ashy filler that was different in color and density from the midden in which the pit was made. There was much charcoal in the top of the pit but no artifacts in association. (See drawing, fig. 36.)

Burial No. 38.—This was an extended burial of a young person at a depth of 1 foot at stake 115–0. There was a flint knife near the center of the grave, and under the head was a large potsherd of limestone temper that was decorated with parallel stamped lines. The burial was definitely intrusive from the surface.

Burial No. 39.—This was a type-5a burial at a depth of 3 feet below stake 120R1. The pit was covered with a charcoal layer. The bodies had remained in anatomical order except the head which had fallen to the bottom of the pit.

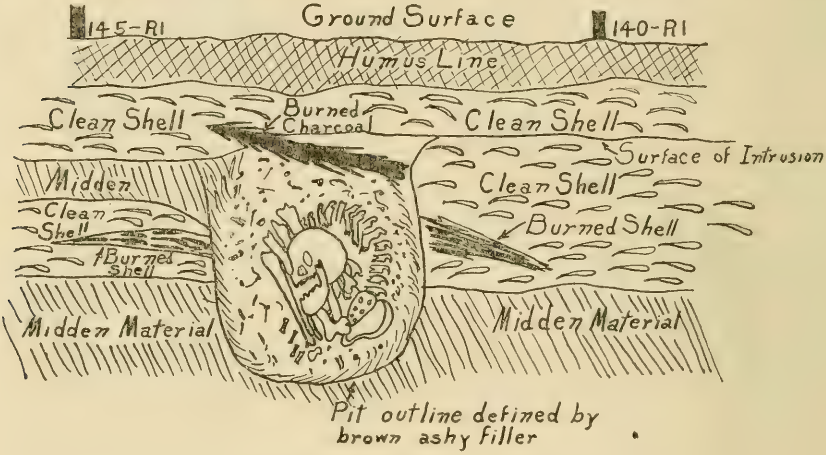

145-R1
Ground Surface
140-R1
Humus Line
Clean Shell
Burned Charcoal
Clean Shell
Surface of Intrusion
Midden
Clean Shell
Clean Shell
Burned Shell
Burned Shell
Midden Material
Midden Material
Pit outline defined by brown ashy filler

FIGURE 36.—Burial No. 37, site Lu° 61.

Burial No. 40.—This was a type-5a burial at a depth of 3 feet below stake 85R1. This burial pit had been dug through a layer of clean shell, and after the body had been placed in it, the pit was filled with clean shell. This held the body in order and prevented the usual slumping. In the bottom of the pit was a large unworked section of antler.

Burial No. 41.—This burial was a type-5a burial at a depth of 3.5 feet below stake 125R1. This pit, which was dug into a midden layer, had been filled with a brown ashy filler which was quite distinct from the midden layer. This filler had held the skeleton in the original position.

Burial No. 46.—This was a sitting burial fully flexed which had slumped to the left side. About the chin were approximately 100

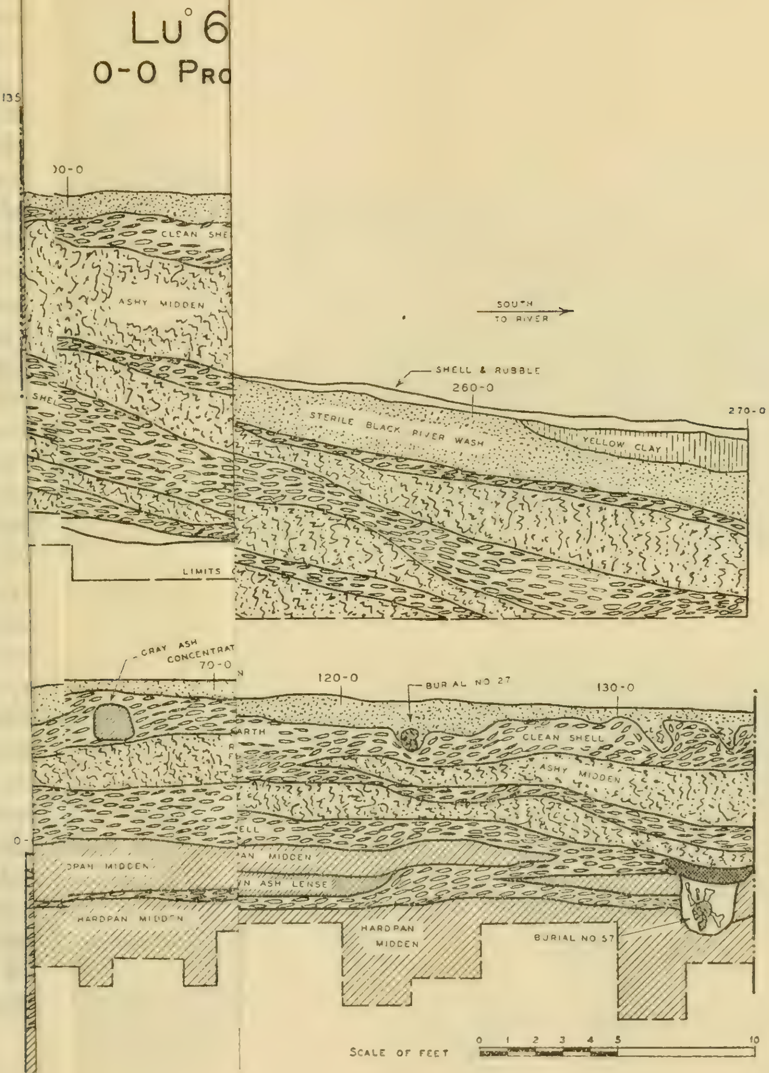

Lu°6
0-0 Pro
135
)0-0
CLEAN SHE
ASHY MIDDEN
SHEL
SOUTH TO RIVER
SHELL & RUBBLE
260-0
270-0
STERILE BLACK RIVER WASH
YELLOW CLAY
LIMITS
GRAY ASH CONCENTRAT
70-0
120-0
BURIAL NO 27
130-0
CLEAN SHELL
ASHY MIDDEN
ARTH
ELL
PAN MIDDEN
OPAN MIDDEN
N ASH LENSE
HARDPAN MIDDEN
HARDPAN MIDDEN
BURIAL NO 57
0-
SCALE OF FEET
0 1 2 3 4 5 10

FIGURE 37.

245407—41 (Face p. 138)

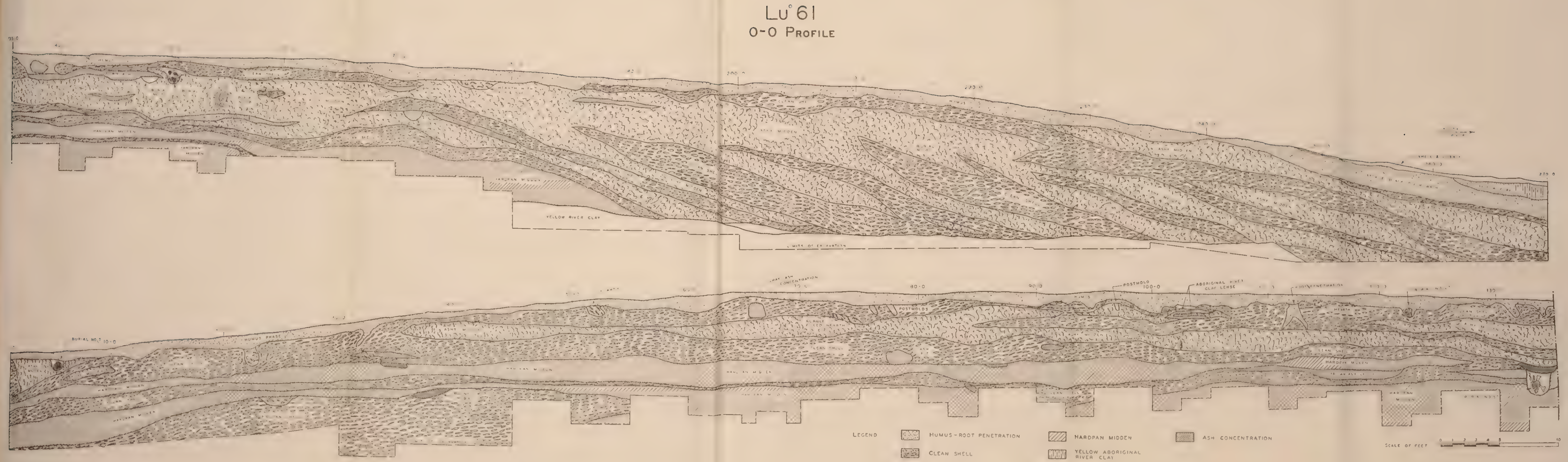

Lu°61
0-0 Profile
200.0
220.0
Ashy midden
Hardpan midden
Yellow river clay
Limits of excavation
Gray ash concentration
80-0
90-0
100-0
Postmold
Postmolds
Aboriginal river clay lense
Burial No. 2 10-0
Humus phase
Clean shell
Legend
Humus-root penetration
Clean shell
Ashy midden
Hardpan midden
Yellow aboriginal river clay
Burned area
Ash concentration
Scale of feet
0
1
2
3
4
5
10

Figure 37.

shell columella beads. This burial was at a depth of 3.5 feet in square 135–0.

Burial No. 49.—This was a fully flexed burial on the right side in a round grave at a depth of 6.8 feet below stake 145–0. Near the chin were 2 red jasper beads and about 25 flat columella shell beads. The original pit in which this burial was made remained to show that it was only 1.5 feet below the level from which it was intruded. This level, however, was 3.7 feet below mound surface.

Burial No. 50.—This was the burial of a child fully extended at a depth of 7.2 feet in square 85–0. Near the left arm was a cache of flat-disk, columella shell beads.

Burial Nos. 51, 52, and 53.—These consisted of one adult and two child burials at a depth of 7.5 feet in square 100–0. These burials were all fragmentary and so badly disturbed that original placement was uncertain. With them were two chipped knives, one of red jasper and one of quartz.

Burial No. 54.—This was a round-grave burial at a depth of 7.2 feet below stake 105–0. With this burial were found a canine tooth of a bear and a red jasper blade.

Burial No. 55.—This flexed pit burial was at a depth of 7.5 feet below stake 100–0. With it was a single gray chert broken blade.

Burial No. 56.—This was a burial of a juvenile fully flexed on the back. It was at a depth of 8 feet below stake 155–0. With this burial were 2 identical conch-shell pendants, 3 large columella beads, about a dozen smaller beads, some 25 truncated gastropod beads, 1 red jasper bead, and 1 cut animal jaw.

Burial No. 57.—This was a completely flexed adult pit burial at a depth of 8 feet below stake 135L1. With it were 1 broken red-jasper point, 1 red-jasper bead, about 50 perforated gastropod beads, and about 12 flat-disk columella beads.

Burial No. 60.—This was a sitting burial at a depth of 6.3 below stake 215–0. Slumping had dislocated the head as usual. A bone needle was found in the grave.

Burial No. 62.—This was a flexed burial on the right side in a pit at the depth of 7.7 feet below stake 130–0. Three blades of gray chert were found in the grave.

ARTIFACTS

Four hundred and sixty-seven pieces of worked flint were taken from the single 10-foot trench which was cut 270 feet long through this mound to varying depths, as shown in the profile (fig. 37). The depth distribution of these specimens is shown in figure 38. When these specimens were distributed into the 58 types previously recognized for Pickwick Basin, there were 17 types which had more than 5 specimens each. In general, there appeared three major groups of type forms. The very long-stemmed, slender blades are represented by types 6, 8, 16, 17, 22, and 44. Of these there were a total of 85. The short, broad form of projectile point was represented by types 7, 9, 13, 18, 27, and 28, as shown in plate 165, figure 2. There were 49 of these. The broad blade of dark-blue flint which is so common on such sites is usually found broken into halves, as shown in plate 165, figure 1. The tips are designated as type 26 and the base end as type 25. Of these types there was a total of 125. Figure 38 shows the distribution of these broad-blade tips and bases compared to the distribution of the broad short types and the long, slender types of projectiles. It will be noted in the depth distribution chart at the 8-foot level there occurred a considerable concentration of flint. Like all other shell-mound sites, flint is always found in diminishing quantities as depth increases. This seems to point definitely to a time when flint was scarce and its use, by the Shell Mound people, was very slight. As in other sites, its slight use here finally led to "shop sites" being formed on the midden—in this case at about the 8-foot level. From that time on flint was more abundant as it gradually increased throughout the upper levels of the mound.

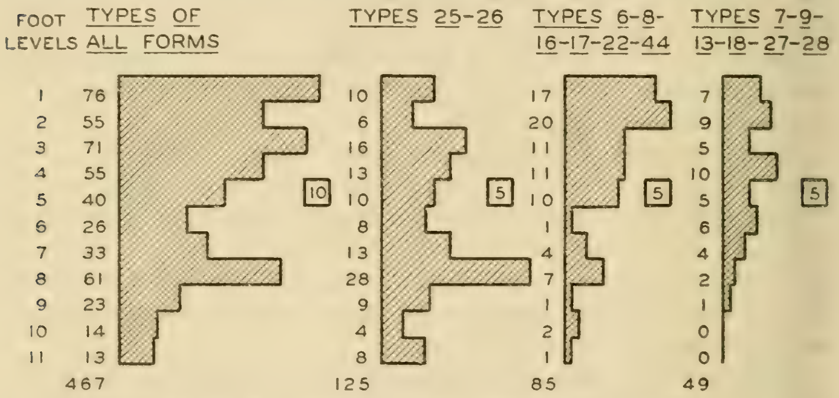


Figure 38.—Distribution of flint artifacts, site Lu° 61.

By an inspection of distribution of types 25 and 26, it may be noted that the maximum for these broad blades occurs also at the 8-foot level. There was at this site, as at other shell mounds in this basin, a distinct level in which occurred the first products of the shop sites. This shop-site level definitely marks a step in the development of flint use. Both the long, slender type and the short, broad types do not appear in abundance at the 8-foot level, but beginning about that level they increase in number to the top, while the broad blades, types 25 and 26, became relatively less important in the upper levels. Had larger excavations permitted the gathering of a great number of specimens, it is confidently believed these observations would have been more forcefully demonstrated.

It thus appears that early in the history of this midden the necessity for the use of flint was met by bringing flint blocks onto the shell midden and working them into broad blades. Many of these blades were broken, and the rejects and spalls formed the shop sites. This flint work gradually led to a diversity of flint types. The two groups of points considered in figure 38 were most numerous and gradually increased in the upper levels of the midden.

Beside the flint specimens, the only other stone artifacts found in this excavation which were listed as field specimens are as follows:

Gorgets of slate	2	Jasper beads	6
Pestles	1	Copper bead	1
Sandstone fragments of vessel	1		
Hematite rubbing stone	1	Total	15
Hammerstone	3		

BONE AND SHELL

The occurrence of bone and shell does not seem to show any definite stratigraphy. The excavations recovered the following list of specimens:

Unworked antler	67	Bear canines	2
Needle awls	59	Antler drift	3
Splinter awls	51	Antler atlatl hooks	2
Cut bone	57	Deer ulna awls	1
Worked antler	20	Fishhook, bone	1
Bone needles	12	Shell pendants	2
Bone projectile points	9	Shell beads (occurrences)	7
Antler points	3		
Bone flakers	5	Total	303
Beaver incisors	2		

It should be noted that while bone and antler artifacts were generally found at all levels, the bone projectile points were found only on the surface or in the 1-foot level. Plate 166, figure 1, presents typical bone artifacts. In the upper left-hand corner are to be seen two horn hooks—the tip end of horns. These horn hooks were evidently the distal ends of atlatls. Typical shell artifacts are shown in plate 166, figure 2.

POTTERY

The excavations here yielded 97 potsherds. It was plain that these sherds belonged to the superficial layer. Nearly all were found in the 1-foot level. Where any sherd was found deeper than that, it was invariably in that portion of the mound slope where erosion had been most active. This region was from stake 0 to 25 and from stake 200 to 270.

These 97 sherds were classified as follows:

Temper:	Number	Number of decorative types
Fiber	12	2
Clay-grit	17	4
Limestone	16	4
Shell	24	1
Sand	28	6
	97	17

The depth distribution of these sherds was as follows:

Foot level:	Depth
1	66
2	18
3	10
4	3

In general it may be said that most of the sherds were extremely small and showed much evidence of weathering and wear. This in itself would seem to demonstrate that here pottery was generally of very superficial occurrence, and that the mound had suffered much erosion since the pottery was laid down.

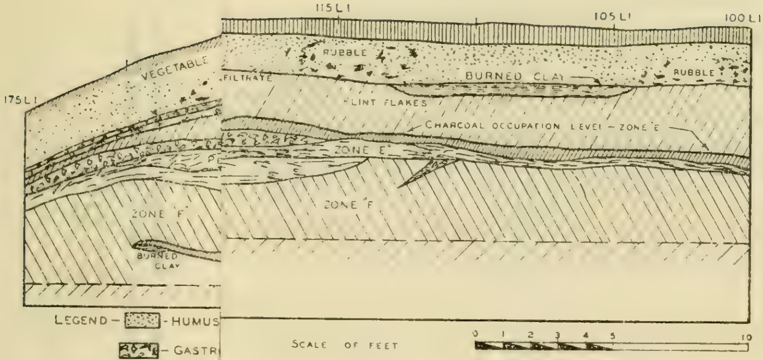
It may be stated with confidence that the original incidence of pottery on this mound was quite superficial and that the pottery users actually laid down very little of the midden, certainly not more than 6 inches and possibly much less. Plate 167 shows samples of four of the wares found at this site.

Meander Scar, Site Lu^{v} 62

This site is located 14 miles west of Florence, Ala., on the right bank of Bluff Creek near the point where that stream enters the Tennessee River. It is 1,500 feet west of site Lu° 59 and is on land owned by Emmet O'Neal of Florence. At this point the terrace of the Tennessee River is some 20 feet higher than the normal river level and extends northward for about a mile to the foothills, a range of limestone bluffs, about 150 feet higher than the level of the river flood plain. This flood plain is often inundated in times of especially high water.

The site is a series of shell and midden lenses exposed on the face of a meander scar where the creek makes a sweeping curve just before entering the Tennessee River. This creek has made numerous changes in its channel, as attested by several truncated meanders along its valley. The normal water level of the creek leaves exposed a meander scar some 16 feet in height.

The lenses of shell, midden, and charcoal are separated by zones of heavy water-lain soil of varying thicknesses, as indicated in the profile drawing (fig. 39). These zones of clay show no stratification within themselves and give no indication of the time involved in their deposition. Being so homogeneous, it is possible that they may have been


115 L 1
105 L 1
100 L 1
175 L 1
VEGETABLE
FILTRATE
RUBBLE
BURNED CLAY
RUBBLE
FLINT FLAKES
CHARCOAL OCCUPATION LEVEL – ZONE E
ZONE E
ZONE F
ZONE F
BURNED CLAY
LEGEND – – HUMUS
– GASTR
SCALE OF FEET
0
1
2
3
4
5
10

245407—41 (Face p. 142)

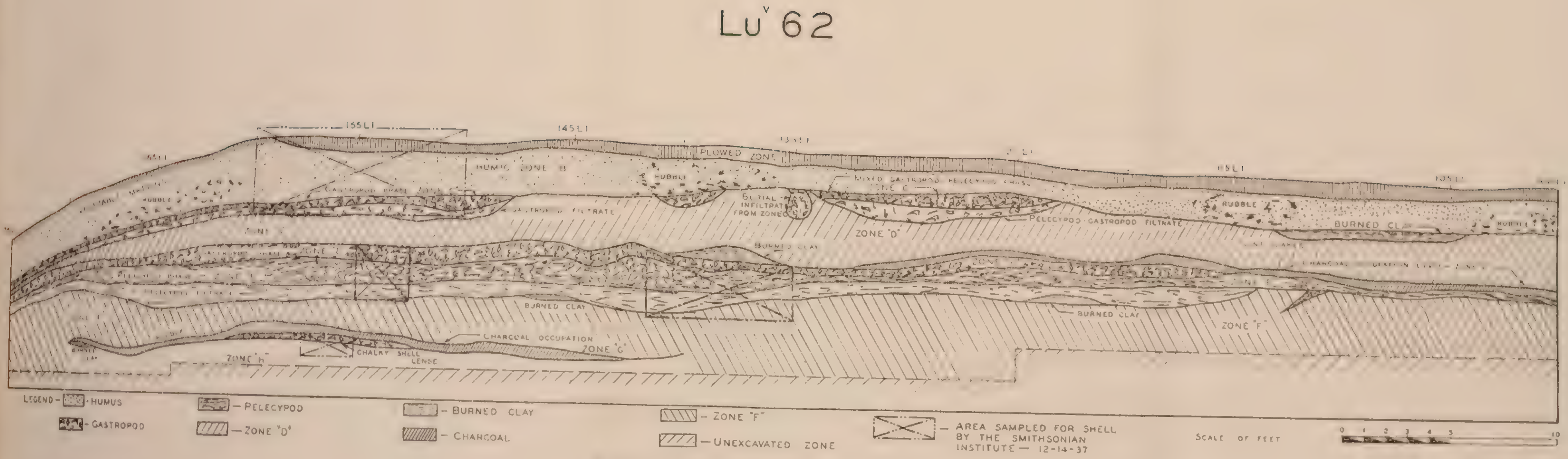

Luᵛ 62
155L1
145L1
PLOWED ZONE
HUMIC ZONE B
RUBBLE
GASTROPOD PHASE ZONE C
GASTROPOD FILTRATE
BURIAL INFILTRATE FROM ZONE C
MIXED GASTROPOD PELECYPOD PHASE ZONE C
PELECYPOD GASTROPOD FILTRATE
ZONE "D"
BURNED CLAY
RUBBLE
BURNED CLAY
BURNED CLAY
BURNED CLAY
ZONE "F"
CHARCOAL OCCUPATION
ZONE "G"
CHALKY SHELL LENSE
ZONE "h"
LEGEND - HUMUS
GASTROPOD
PELECYPOD
ZONE "D"
BURNED CLAY
CHARCOAL
ZONE "F"
UNEXCAVATED ZONE
AREA SAMPLED FOR SHELL BY THE SMITHSONIAN INSTITUTE — 12-14-37
SCALE OF FEET
0 1 2 3 4 5 10

FIGURE 39.—Exposed profile, site Luᵛ 62.

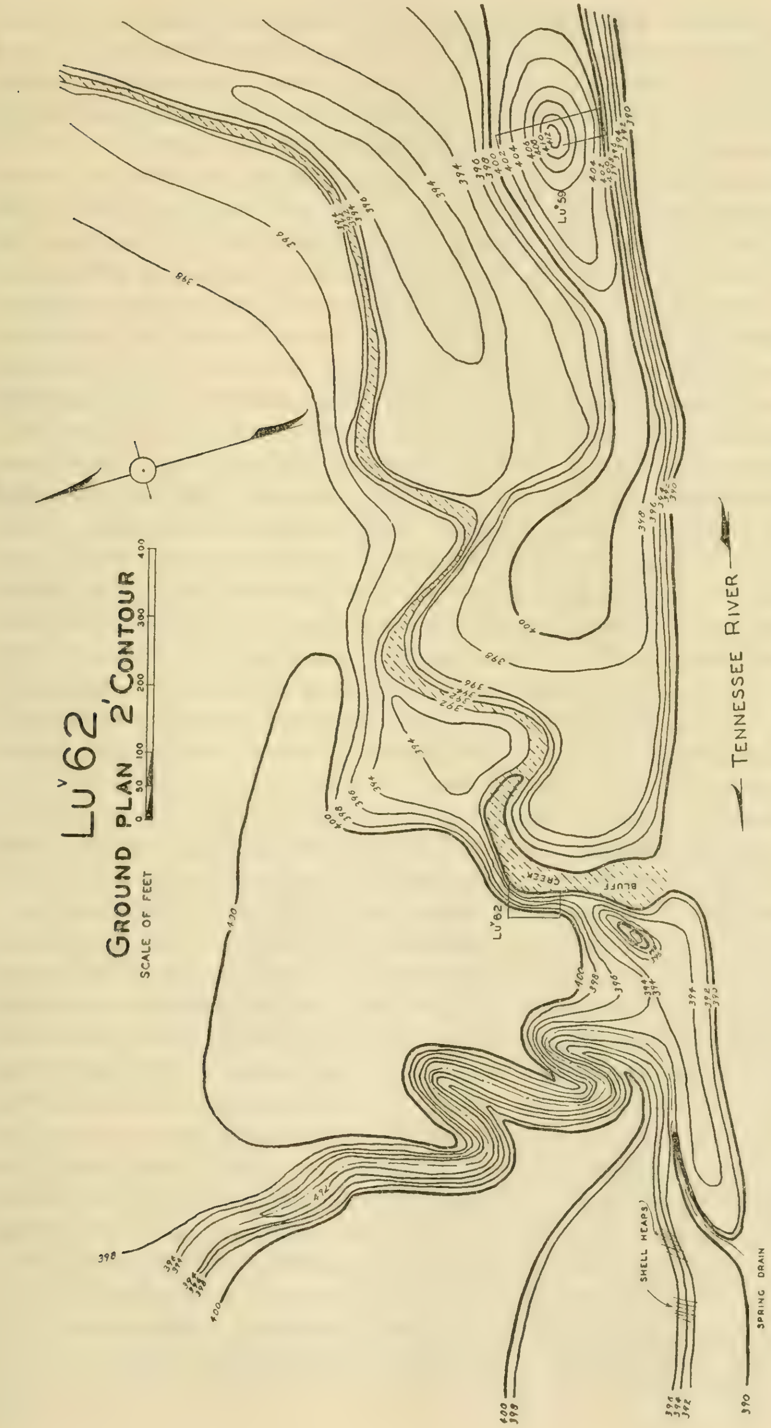

Lǔ62
Ground Plan 2' Contour
Scale of feet
0 50 100 200 300 400
Lǔ59
Lǔ62
Creek
Bluff
Tennessee River
Shell heaps
Spring drain
398
396
394
400
390
392

FIGURE 40.

laid down in a short period, as one flood stage, or perhaps may have taken several decades or longer to accumulate. The finding of a large pestle inclusive in one of the clay zones suggests the former condition probably obtained. However, it is apparent that the site was intermittently occupied during periods of low water.

Topographically, the site is not lower than the lower levels of midden within site Lu° 59. Figure 40 shows the topography about the mouth of Bluff Creek. Just opposite to the mouth of this creek the river is not very deep and a large island lies in the river, as shown in plate 170, figure 2. Until recently cleared, it was heavily wooded.

Attention was called to the site by James Boatwright, tenant on the farm, at the time of the Survey in 1936. At that time opportunity did not permit excavation, but the vines, shrubs, and weeds were cleared from the face of the meander scar to reveal a natural profile as shown in plate 168. During the winter of 1936 high water along the whole course of the Tennessee River enabled Bluff Creek to reach flood stage and a great amount of erosion of its banks resulted. Plate 169, figure 1, shows this site after the flood had subsided. In the summer of 1937, a brief excavation of this site was possible. A profile 75 feet long, extending along the western bank of the creek, was staked off, and cut down by zones, as shown in plate 169, figure 2. The high creek wall permitted an easy disposal of excavated earth to be made by dumping it into the creek, as shown in plate 170, figure 1. The profile was cut down through several layers of shell and midden to sterile clay, as shown in plate 171.

Figure 39, which is the first profile revealed, shows in some detail the various occupational levels on the plateau above the meander scar. The zones indicated thereon may be described as follows:

Zone A.—This zone was taken arbitrarily to be that portion of the profile which had been disturbed by the plow. At the present time this zone is deeply matted with Johnson grass and its average thickness is about 0.6 foot. From the 100- to 157.5-foot stakes the site had been plowed, and from the 157.5- to 175-foot stakes the zone is filled with a deep matting of cane roots on the sloping face of the river terrace. There is no color differentiation between zone A and the underlying zone B, although the latter contains more rubble than zone A. Zone A is very black when wet, and dries gray. It is practically a clay which carries a small amount of silt. It has derived its black color while in situ and does not represent a washed-in deposit of black earth. It contains some artifacts of flint and pottery.

Zone B.—This zone is black when wet and gray when dry. It is a clay with some silt and a high aboriginal rubble content. It contains potsherds and flint, and represents the lowest extent of humic discoloration from the present surface of the site.

Zone C.—This is a small shell lens, mostly of gastropods, which occur from the 120- to the 175-foot stakes. From the 100- to the 120-foot stake, this shell lens is replaced by an area of red burned earth which may represent an occupational floor of a dwelling.

This zone has fiber-tempered pottery, a considerable amount of rubble, and many flakes of flint. There is a considerable amount of clay-intermixture with the shell. On the profile the lens of shell is divided into a relatively concentrated accumulation of shell, as contrasted to a thinly distributed band of shell below the former which seems to represent an infiltration.

Zone D.—This is a river-deposited, yellow clay, slightly darkened by root penetration, with some silt. It has many flint chips, but no rubble. The flint is irregularly distributed through the clay.

Zone E.—This is a shell lens, the upper portion of which is largely gastropods. It has been designated on the profile drawing as the gastropod phase of zone E, which extends from the 120- to the 175-foot stakes. The middle portion is predominately pelecypods and has been designated the pelecypod phase of zone E. The lower portion of the zone has the shell mingled with a relatively high amount of river deposition and has been designated as the filtrate phase of zone E. From the 100- to the 135-foot stake is found an old charcoal occupational level. It is black, and has a high rubble content. Zone E has a small amount of flint, but no pottery.

Zone F.—This is an unmistakable, bright yellow, river-deposited clay completely sterile of aboriginal remains.

Zone G.—This zone shows itself on the extreme south portion of the profile only. It is composed of a thin charcoal occupational level, underlain by extremely fragile and disintegrated shell. No artifacts were recovered from this zone, although a few flint chips were found. Most of the shell in this zone appears to be pelecypods. Going from south to north, this zone pinches out to a faint discoloration in the soil not indicative of aboriginal occupation.

Zone H.—This is a clean, bright yellow, river-deposited clay, completely sterile of aboriginal remains, and analogous to zone F.

BURIALS

In the limited excavation at this site only two burials were found. Skeletal material was found in poor condition, seemingly due to the high acidity of the soil, which has also reacted on the enclosed shell. Both of these burials were of the fully-flexed type, one at a depth of 3 feet in a pit 2.5 by 2 feet in square 130L1, and the other at a depth of 5 feet in square 150–0. This burial was intruded into zone D from the top of that zone. No artifacts were found with either burial.

ARTIFACTS

The flint was undifferentiated in zones A, B, and C. Fifty-one specimens were taken from these zones, and when classified according to type were found to be distributed as follows:

Broken points, not classified	10
Type 23	17
Type 8	4
Type 18	4
Type 22	2
Type 7	3
Type 28	3
Type 52	2
Miscellaneous types (represented by 1 each)	6

Zone D was sterile. Zone E contained 11 flint specimens, 3 of type 23, 3 broken points, and 5 miscellaneous types represented by 1 specimen each. Zone F was sterile, and zone G yielded 4 miscellaneous specimens. The total number of flint specimens from this cut was 56.

POTTERY

Pottery was limited to zones A and B and on the surface of zone C. Thirty-six sherds were found, 23 being fiber temper; 5, clay-grit temper; 2, sand temper; and 6, hole temper (presumed to be limestone temper, bleached).

ANIMAL BONES

All animal bones found seemed to have been cracked for marrow. Bones from the following were identified: Deer, raccoon, ground hog, terrapin, snapper turtle, and drumfish.

WRIGHT MOUND, SITE NO. 1, Lu° 63

This site was a conical earth mound on the farm of D. J. Edwards some 16 miles west of Florence in Lauderdale County on the Florence-Waterloo road. About one-half mile east of the crossing of Long Branch, this site could be seen as one of two earth mounds, about 200 feet apart and about 500 feet south of the roadway. At this point the fertile river bottom is about a mile wide, and extends as a very level plain southward from the roadway, which in turn skirts the foot of the hills to the northward, and very nearly marks the northern edge of the Pickwick Basin at this point.

About 1,000 feet eastward of these mounds the land rises sharply in several ridges, at the foot of one of which is a fine spring. In the vicinity of these mounds and for several miles westward the very fertile river bottom land has long been in cultivation. This cultivation has at times included the mound area, and much earth had undoubtedly been "plowed down" from this mound and its companion to the west, Lu^{o} 64. However, both of these mounds retained sufficient height above the fields to make them very conspicuous objects when the fields were cleared of plant growth, as shown in plate 172, figure 1. Between these mounds and the spring was an area, site Lu^{v} 65, of exceptionally dark soil, containing much mussel shell and other debris of a village midden. Despite the fact that this land had been in cultivation for several generations, and was known to be sometimes flooded by the river, this midden area and several others like it to the southwest were revealed whenever the land was cultivated. This would seem to show that the bottom land in the vicinity of this site had once been used somewhat extensively as a dwelling place, whether by the builders of the mounds or by others remained to be determined.

From the general appearance of this mound and its location, experience suggested that it might belong to the group designated in the Archeological Survey of Wheeler Basin as the Copena complex. This expectation was verified by very careful excavation. Recognizing the possibility that subterranean pit burials were likely to be revealed, the trenches from the first were sunk deep into undisturbed subsoil, and vertical profiles were read frequently and carefully for any trace of intrusive pits. When pits were found, they were not at once cut into, but the undisturbed subsoil outside the pit was excavated, thus bringing each pit into a raised pedestal. Later, by hand trowel and brush, the pedestal could be cut down carefully and each pit made to reveal its secrets.

This technique of excavation of Copena sites has proved very satisfactory and seems to be necessary in order to obtain information from these sites Plate 175, figure 2, shows the application of this method. The advanced stage of decomposition of skeletal material leaves nothing to guide the hand of the excavator if he seeks to explore such a pit by excavating the pit from above.

If the pits are numerous and the pedestals have to remain many days in very dry weather before they can be cut down, it is recommended that the tops be covered again with loose earth, as shown in plate 175, figure 1, to prevent excessive drying and, therefore, hardening of the heavy clay. Small paulins used as covers are also a great aid in conserving necessary moisture. It is believed this method is capable of yielding information on Copena sites which might not otherwise be obtained.

Since on these sites this method makes it necessary to penetrate rather deeply into the undisturbed subsoil which is costly in hours of labor, it may be pointed out that labor can be saved by not attempting to excavate under the eroded portions of such mounds as no subfloor pits are found there. The profiles may thus often be shortened, as shown in plate 182, permitting necessary deep penetration without

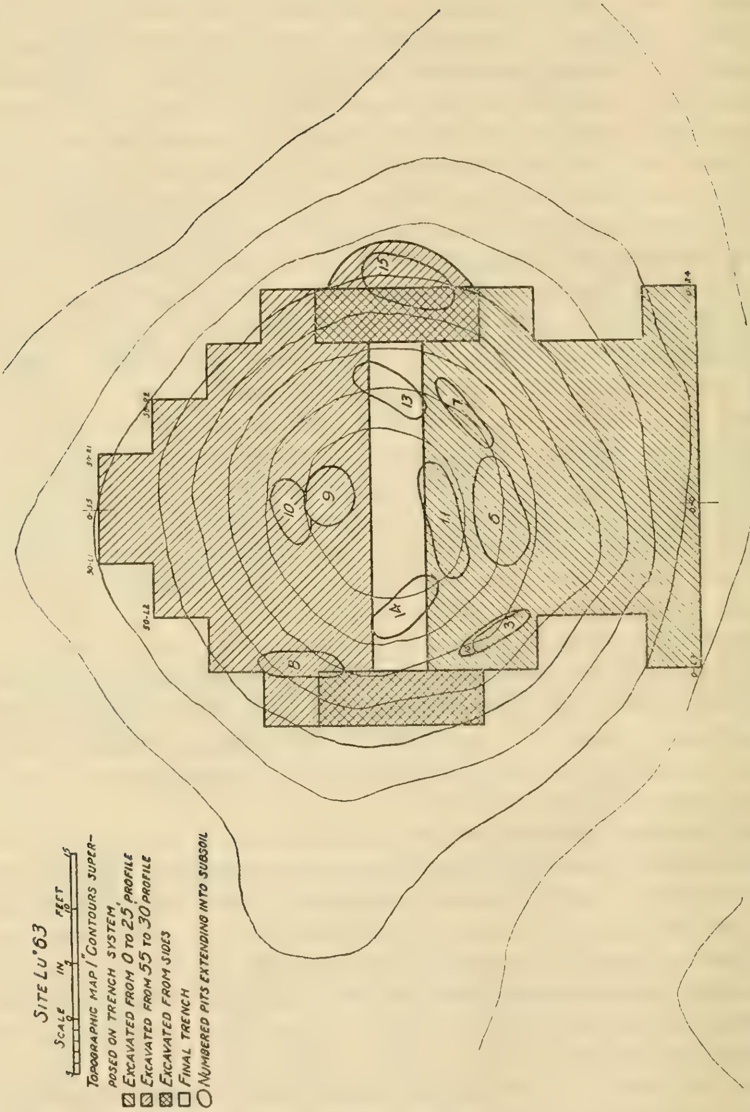

SITE LU°63
SCALE IN FEET
0
5
10
15
TOPOGRAPHIC MAP 1" CONTOURS SUPERPOSED ON TRENCH SYSTEM,
▨ EXCAVATED FROM 0 TO 25' PROFILE
▨ EXCAVATED FROM 55 TO 30' PROFILE
▩ EXCAVATED FROM SIDES
☐ FINAL TRENCH
○ NUMBERED PITS EXTENDING INTO SUBSOIL
15
13
7
10
9
11
6
14
3
8

FIGURE 41.—Topographic map, site Lu° 63.

excessive labor cost and greatly aiding in the disposal of excavated earth.

Figure 41 shows a topographic map of the mound upon which has been superposed a drawing of the trench systems. The mound was staked off in 5-foot squares from an E.-W. base line along the southern edge, and the profile at every 5-foot cut, from 5 to 25 feet, was exposed and photographed in order, looking north. Because of the size of the working crew, it was desirable also to start an E.-W. trench on the north side of the mound between the 50- to 55-foot profile; and the profiles from the 50- to 30-foot cuts, inclusive, are shown looking southward. It was possible to shift the crew from one trench to another and thus permit slower and more careful investigation of all features without unduly holding up the work of excavation of the more sterile portions of the mound.

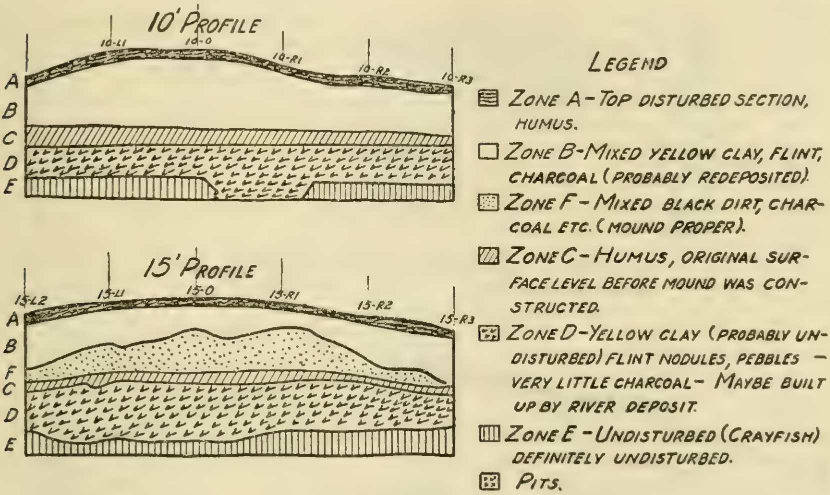

10' Profile
10-L1
10-0
10-R1
10-R2
10-R3
A
B
C
D
E
15' Profile
15-L2
15-L1
15-0
15-R1
15-R2
15-R3
A
B
F
C
D
E
Legend
Zone A - Top disturbed section, humus.
Zone B - Mixed yellow clay, flint, charcoal (probably redeposited).
Zone F - Mixed black dirt, charcoal etc. (mound proper).
Zone C - Humus, original surface level before mound was constructed.
Zone D - Yellow clay (probably undisturbed) flint nodules, pebbles - very little charcoal - Maybe built up by river deposit.
Zone E - Undisturbed (Crayfish) definitely undisturbed.
Pits.

Figure 42.—The 10- and 15-foot profiles, site Lu° 63.

PROFILES

The profiles revealed some six zones fairly easily distinguishable each from the other, which extended horizontally throughout the mound. They were designated from the top downward in order as A, B, F, C, D, and E, and are shown outlined by strings in plates 172, figure 2; 173; 174; and 176, figure 1; and were indicated by lettered tags attached to the trench walls.

Zone A is the upper layer of humus topsoil disturbed by the plow.

Zone B is made of mixed yellow clay containing small fragments of charcoal (probably redeposited earth).

Zone F is made of earth, black soil, and clay mixed with charcoal, which constitutes the mound proper, and contained a few flint chips and potsherds.

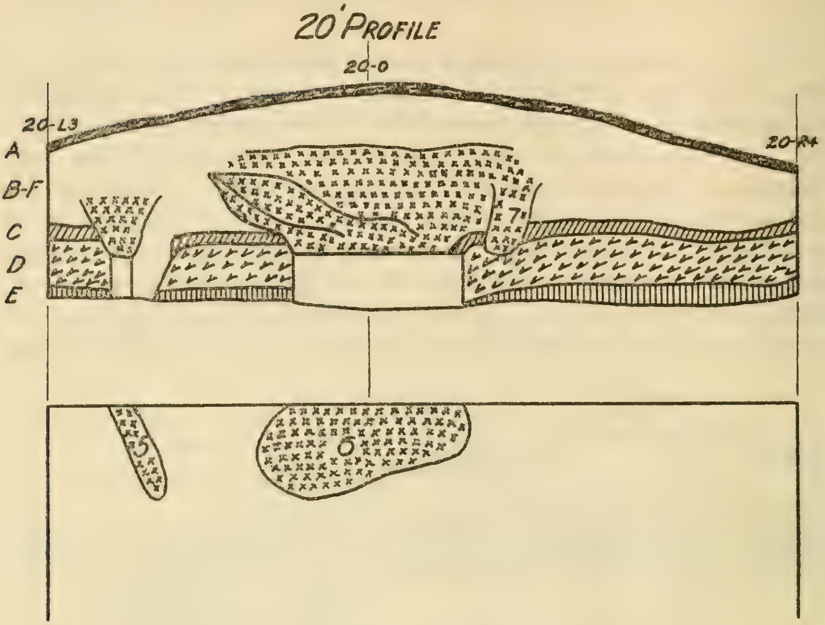

20' PROFILE
20-0
20-L3
20-R4
A
B-F
C
D
E
7
5
6

Figure 43.—The 20-foot profile, site Lu° 63.

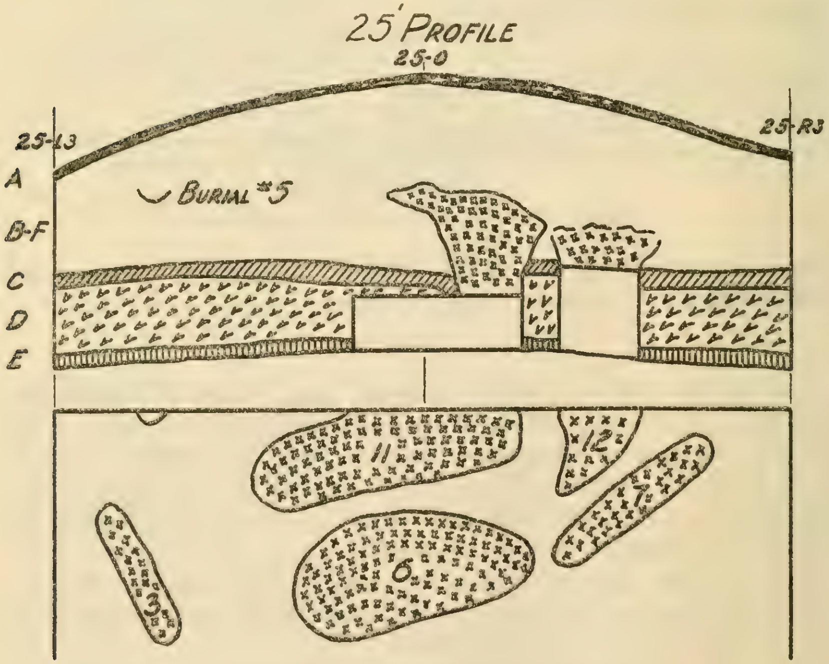

25' PROFILE
25-0
25-L3
25-R3
A
BURIAL #5
B-F
C
D
E
11
12
7
6
3

Figure 44.—The 25-foot profile, site Lu° 63.

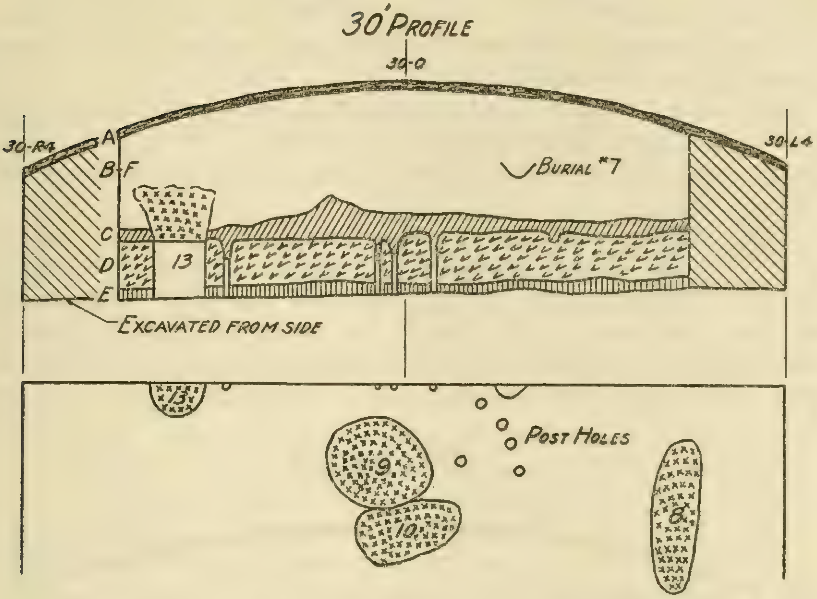

30' PROFILE
30-0
30-R4
30-L4
A
B-F
C
D
E
BURIAL #7
13
EXCAVATED FROM SIDE
13
POST HOLES
9
10
8

FIGURE 45.—The 30-foot profile, site Lu° 63.

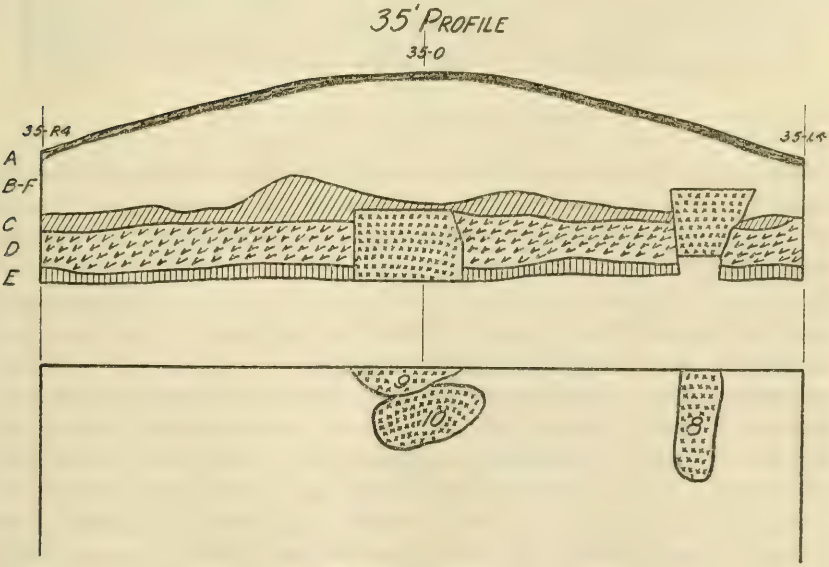

35' PROFILE
35-0
35-R4
35-L4
A
B-F
C
D
E
9
10
8

FIGURE 46.—The 35-foot profile, site Lu° 63.

Zone C is the old humus layer upon which the mound was constructed.

Zone D is yellow clay containing flint nodules and pebbles, and a trace of charcoal. This was probably built up as a river deposit before the occupancy of the site.

Zone E is "crayfish" soil, definitely undisturbed. Drawings of profiles are shown in figures 42 to 47, inclusive. Where the vertical profile cut into a pit, the horizontal form of the pit is shown projected in plan.

It would appear that the mound was definitely erected for the purpose of burial. Burial pits were dug through zone C into zones D and E. The mound was erected on top of zone C by earth carried in from elsewhere. Later burials were intruded into the mound, which resulted in mixing of soil of adjacent zones throughout the pits. These pits may not always have been filled by the return of earth taken from them, but the earth removed seemingly in some cases was left where it was thrown out and fresh earth was used to fill the grave and build the mound higher. It was not always possible because of this fact, to tell exactly from what level the pit was intruded. In all, some 16 pits were found at different levels, 9 of which extended into the undisturbed subsoil. While it is believed all pits were dug as graves, and many did contain evidence of burials, such as fragmentary bones and artifacts, yet some pits were devoid of any artifacts or bones. Careful working out of these last-mentioned pits did not reveal any remaining suggestion of a grave except the form of the pit. All pits were oval in shape and were of the order of 8 feet in length by some 2½ feet in width. This would suggest burials extended in the flesh. However, the skeletal material was so badly decayed, that only a few fragments of long bones, a handful of teeth caps, or the imprint of a skull in the clay constituted the entire residue of such burials.

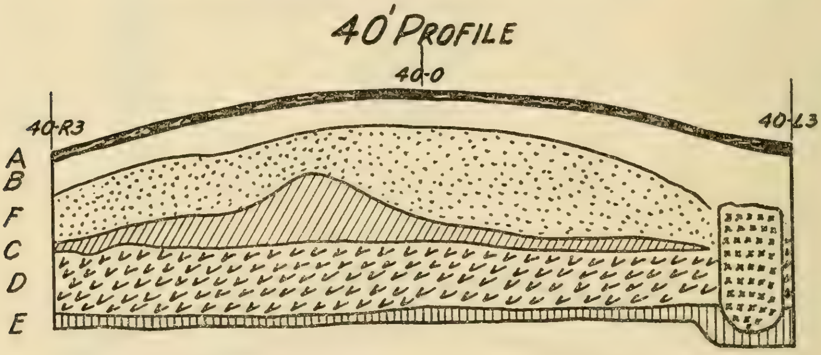


FIGURE 47.—The 40-foot profile, site Lu° 63.

FEATURES

Besides the pits and profiles the only other features found may be described as follows:

Feature No. 2.—Post molds. These are shown in plate 174, figure 1, and some are discernible in the 30-foot profile. Some were left standing in cylinders of clay, later to be cut down to determine the form and depth of the mold. These appear to have extended through zone C, but they are not revealed above the top of that zone. A longitudinal section of these molds revealed that the posts making them, from 3 to 5 inches in diameter, were crudely pointed at the bottom. This definitely suggests that these posts were seated by being driven in from the top of zone C. A total of 13 post molds were found scattered without definite pattern on the main floor of the mound.

Feature No. 4.—Described as a "petrified log," as shown in plate 176 figure 2. This object in two pieces appears to be a folded section of tree bark which has absorbed, or been impregnated with lime to such an extent as to have made it quite heavy and able to resist further decay. This lime infiltration has probably been the result of seepage of water in the soil. These sections of log lay in the 25–0 square at a depth of 6 feet 10 inches.

Feature No. 5.—A circular fireplace about 2 feet in diameter on the top of zone C in the 25L1 square at a depth of 7 feet, 9 inches, below mound surface. This fireplace is shown in plate 180, figure 2. It was made of clay lying on the humus layer. The clay was burned red and the area was covered with ashes.

BURIALS

It appears as a characteristic of the earth mounds of the copper-galena complex that all skeletal material is in very poor condition. Often the bone remnants are mere crumbs, or perhaps only a stain in the soil. Occasionally only the impression of a skull remains. A total of 16 burials were recorded, several upon only circumstantial evidence.

Burial No. 1.—Inclusive in zone F, 3 feet below stake 20.0, were found two long bones badly decayed in association with two large galena balls, and two copper spools (ear ornaments). At the distance of 1 foot a flint spear point was found. No pit line could be definitely established, and it appeared, therefore, that this burial was included in the F zone as earth was brought upon the mound. This burial is shown in plate 179, figure 1.

Burial No. 2.—Inclusive in zone F and 4.3 feet below stake 35.0 were found fragments of long bones, and the outline of a skull in a pit long enough to contain an extended burial. A large ball of galena coated white outside was found with the bone fragments. Two other balls of galena were 4 inches below the burial level, resting in a pocket of baked clay and charcoal.

Burial No. 3.—Resting in zone D intruded from zone B through F and C zones, was found a long narrow pit. The bottom was 6.5 feet below stake 20L2. In this long pit no artifacts were found and only the outline of a skull in small fragments remained.

Burial No. 4.—In zone B–F, 5 feet below stake 30.0 and entirely above zone C, was found an infant burial. The bones were very fragile. A conch shell was found inverted over the left shoulder and a ball of galena at the right side near the elbow, as shown in plate 177, figure 2.

Burial No. 5.—Inclusive in zone B–F, 3 feet below stake 25L2, were found fragments of skull.

Burial No. 6.—In zone B–F, intruded from the surface, was found a pit in square 25L2. In this pit were a few fragments of skull bones, and the crowns of teeth. With this burial were found a copper celt covered with woven textile (pl. 181, fig. 1), and a ball of galena. About 1 foot above the bottom of the pit were three large pebbles. From the size and shape of the pit and the position of the teeth in one end of the pit, one would infer an extended burial.

Burial No. 7.—Intrusive into zone B, 5 feet 4 inches below the surface into square 30L2, a pit had been dug, which was oval in form, about 6.5 feet long and 2 feet wide. The bottom had been lined with puddled blue clay from 5 inches to 2.5 inches thick. This layer was raised at the edges to make a slightly concave basin. Upon this layer it is inferred a burial had been made, but only remnants of a skull remained at one end. The clay lining is shown in plate 177, figure 1.

Burial No. 8.—In square 25L1 at a depth of 6 feet 2 inches just above zone C was found a patch of black burned material in two layers, each layer about 0.5 of an inch thick and about 10 inches in diameter. A string of copper beads, as shown in plate 181, figure 2, were found lying between these layers of burned material. Two fragments of bones, possibly humerus, were found in association. While it may not be definitely asserted that here is a cremation, certainly this deposit would suggest the possibility that a container for the beads and possibly bones had been burned elsewhere and deposited on the mound and covered over.

Burial No. 9.—Intruded into zone D from above zone C in square 15L1 was a large oval pit about 10 by 4 feet, and 4 feet 2 inches deep. In the center of this pit at the bottom was a copper "breastplate" covered with woven fabric—well preserved—as shown in plate 179, figure 2. Beyond the copper, the only evidence of a burial was the form of the pit.

Burial No. 10.—Intrusive into zone D from zone C or above, in square 20L1 and at a depth of 3 feet 10 inches, was a pit some 10.5 feet long by 2.5 feet broad. On the bottom of this pit near one end was the outline of a skull and the crowns of many teeth. On the floor of the pit were three copper spools, one on each side of the teeth crowns, and one about a foot apart. Also, there was a copper reel-shaped object near the center of the pit, approximately where the chest of an extended skeleton would have been, and at about the position of the pelvis was a grooved ball of galena. The disposition of these artifacts are shown in plate 178, figure 1. The walls of this pit showed evidence of having been lined with bark or wooden slabs covered by bark.

Burial No. 11.—In an elongated oval pit in square 15L3 at 6 feet below the surface, a copper "breastplate" was found covered with woven textile, well preserved. No other indication of burial remained in the pit.

Burial No. 12.—In square 35–0 and nearly 10 feet below the surface of the mound, a pit extended from above zone C. In the pit were found a few teeth, and a large flinty rock showing working.

Burial No. 13.—In square 30L3 a pit extended into zone E from above zone C to reach a depth at bottom of 9.4 feet. In this pit was the outline of a skull at one end. A greenstone celt was in about the region of the pelvis, if there had been an extended burial in the pit. Two balls of galena were close by a flint rock. This burial is shown in plate 178, figure 2.

Burial No. 14.—In square 25L2 a rectangular pit intruded into zone E had its bottom at a depth of 8 feet below mound surface. In this pit were a few teeth and a ball of galena nearby.

Burial No. 15.—In square 20R1, in zone D a long pit had been dug from zone C. In the end of this pit there was found the remnants of a skull and six small balls of galena, one of which was coated nearly completely with sulfur.

Burial No. 16.—In square 20R4 there was intruded into zone E, from zone D or above, an elongated pit about 3 feet by 9 feet. In this pit no bone was found, but a copper reel-shaped object and two balls of galena appeared about where the chest of an extended skeleton would have been if the pit contained an extended burial. The base of this pit is shown in plate 180, figure 1.

Post molds.—The post molds, found to the number of 13, were all intruded into zone D and were filled with the soil of zone C. They showed no arrangement indicating any structure wall and their purpose is conjectural. That these are true post molds there seems little doubt. They appeared to have been made by bluntly sharpened stakes driven into the earth. Since they were in the midst of the area of burial pits and on the same level as the original humus layer upon which the mound was erected, it may be assumed that they are coincident in time with the pit burials and may have served some useful function in connection with the burials.

POTTERY

The complex of traits designated as Copena of which this site seems to be an example, is characterized by an entire absence of pottery as mortuary offerings. As is usually the case in this complex, the earth of the mound is comparatively clean earth. While there was some charcoal in zones B and F, there was no bone material and very little shell or flint chips were found. All of the potsherds found in the site were recovered from the general digging and only an occasional sherd came from the mixed earth in the pits. None were found in association with any burial, structure, or other artifacts. Zone C, which was the old humus zone in this mound, yielded the greatest number of sherds, a total of 64. Of these, 17 were plain, limestone-tempered ware, type 3a (pl. 187, fig. 1), and 47 were rectangular or rhomboidal stamped limestone-tempered ware, types 3c and 3d (pl. 187, fig. 2). All of the sherds from the entire site were limestone tempered, and although a great many were badly leached, the irregular angular shape of the holes indicated that they were tempered with crushed limestone.

Zone B contained 19 plain, and 24 stamped sherds.

Zone B–F contained 11 plain, and 6 stamped sherds.

Zone F contained 13 plain, and 6 stamped sherds.

In a village site, Lu° 65, in the vicinity of this mound, occurred pottery of each of these types. Therefore, it would seem reasonable to assume that such sherds as were found in this mound were chance inclusions, as the result of gathering up of earth from a village site which had this type of pottery on it. The presence of these sherds in the mound does not, therefore, of itself, demonstrate that this pottery belongs to the Copena complex. That this type of pottery is precedent to the mound, seems demonstrated by its occurrence in greatest amount below the old humus line which seems to indicate that the mound was erected on the site of a village.

STONE ARTIFACTS

In the general digging, 10 crude and broken flint projectile points, and 6 crude flint knives or scrapers were found. Most of these came from the edge of the mound, at no great depth, and their inclusion below the surface may be due to erosion from the sides of the mound. These are shown in plate 183, figure 1, together with a flint object 4.75 inches long, which has a definite notched stem at each end. This article, which may have been a knife or "draw shave," was found in the general digging near the surface. None of these objects were in association with any burial or pit. Only 1 flint object, the knife or spear point shown in plate 179, figure 1, was in any definite association. It was found with copper ear spools and galena in burial No. 1, and is believed to be typical of this complex. The object is made of white flint 4.5 inches long and is 1.1 inches wide at its broadest point.

The greenstone celt shown in plate 186, figure 1, the only one found at this site, is 7 by 2.25 inches in size. It is highly polished, but the pole has been damaged by battering.

Only one greenstone spade, shown in plate 186, figure 2, was found. This was an unfinished spade showing no signs of wear or polishing. It had rough chipping along planes of schistocity with secondary chipping along lateral margin and base. The cutting edge was thin and produced by removal of two large flakes. There was no secondary chipping on this edge. It had a maximum length of 22.5 inches, a width of 6.8 inches, and a thickness of 0.6 inch.

COPPER ARTIFACTS

In most sites of the Copena Focus the copper artifacts are most conspicuous. Plate 184, figure 1, shows a typical copper reel 6.5 by 7 inches of beaten copper about 0.1 inch thick. This reel, taken from burial No. 16, was badly corroded. It was comparatively thin for these objects, and the tip ends of each arm had been beaten to give them a broad, spatulate form.

The copper celt shown in the same figure was made of sheet metal 0.2 inch thick. It has a maximum length of 1.75 inches and a breadth of 1.8 inches. The pole end is formed by folding over the sheet copper for a distance of 0.5 inch.

The copper beads, some 75 in one string, were made by drilling small nuggets of copper.

The ear ornaments were usually in a poor state of preservation. They were made of very thin sheet copper and some were so corroded that the metal had disappeared, leaving only copper salts. Each was constructed of two concave disks, riveted together at the center by a small cylinder of copper. The disks varied in diameter from 1.3 to 2 inches. Each disk was made of a double sheet of copper, and several contained remnants of string wound around the central rivet.

Two so-called breastplates of copper were found. These were rectangular sheets of copper 7.5 by 4 inches, approximately, and quite thin. There was little metal remaining of these plates, but nearly all had been converted into copper salts. These plates had evidently been near the body of the individual with which they were buried. One of these plates (the remnant of it is shown on the left in pl. 185, fig. 1) had next to it, on the underside, the textile shown in center of the figure, and above it on the outer side the matting shown on the right. This matting, made of flat fibers of bark about 1 inch wide, was woven both warp and weft "under one and over four." This weaving formula was probably necessary in view of the stiffness of the flat fibers to avoid breaking them by sharp bending.

The textile shown in the center of plate 185, figure 1, represents a coarsely woven cloth made of twisted fiber strings. The weft element consists of two parallel strings, each closely twisted from two separate elements. The warp is simple twining, which gathers up the twisted weft strands in pairs. This cloth probably constituted a garment which was worn at the time of the burial. The copper breastplate lay upon it, and the whole was covered with matting. The copper salts preserved both the textile and the matting where it was in contact.

A second copper breastplate, shown in situ in plate 179, figure 2, was covered on top with a matting which, when cleaned and removed from the plate, appeared as shown in plate 185, figure 2. The under side of the copper plate had adhering to it, over half of its surface, a material with a mottled surface, but showing no mesh. This is evidently a piece of leather, perhaps deerskin, with the hair still attached. This is shown on the left side of plate 184, figure 2. Plate 186, figure 3, shows a second copper reel of smaller size, about 5 by 5 inches, taken from burial No. 10. With it are fragments of matting found adhering to the copper celt shown in situ in plate 181, figure 1. To one of these pieces of matting fragments of bark adhered on the under side. The matting thus preserved had been laid over bark. This would seem to suggest a bark-lined grave pit, floored with matting, upon which the artifacts accompanying the body were laid, and the whole covered with matting.

In addition to the large conch-shell vessel (pl. 183, fig. 2) found covering infant burial No. 4, the only other shell artifacts were two perforated shell disks of diameter 1.8 inches and thickness 0.15 inch with hole 0.5 inch in diameter.

A summary of the artifacts taken from this site may be stated as follows:

Intentional inclusions mostly associated with burials

Copper ear spools	5
Copper reel-shaped objects	2
Copper celts	1
Copper beads, string (75)	1
Copper breastplates	2
Galena balls	21
Celts, greenstone	1
Spades, greenstone	1
Flint spear	1
Conch shell	1
Shell disk beads	2

Chance inclusions

Crude flint scrapers	6
Draw shave flint	1
Flint projectile point	10
Potsherds limestone-tempered	64

WRIGHT MOUND, SITE NO. 2, LU° 64

This site is an earth mound, a companion of site Lu° 63 and distant from it about 200 feet, on the farm of D. T. Edwards about 16 miles west of Florence in Lauderdale County, Ala. It was in a cultivated field in the broad river bottom, as shown in plate 188, figure 1, and was thus a very conspicuous object from the Florence-Waterloo road—about 500 feet distant. The field about the base of the mound had been in cultivation for many years. Having been long cleared of large trees, it had suffered considerable erosion due to weathering and cultivation. About 1917 some local residents decided to excavate the mound by the aid of a team and scraper in a hunt for treasure. A trench was run into the mound which penetrated nearly to the mound base. It is not known what attempt was made to fill the trench after excavation, but it was never completely filled. The walls of the trench finally fell in, leaving an elongated depression across what once was the highest part of the mound. This depression is shown in plate 188, figures 2 and 3. This trench destroyed much information and permitted water to enter deep into the center of the mound which probably assisted decay of material. However, it has been shown on numerous occasions that such vandalism never entirely destroys the whole record. There is usually enough information left to justify a careful and thorough investigation, as was true in this case. The mound was cleared and partially excavated in the spring of 1937. The excavation was undertaken at that time because very high water in the Tennessee River had so flooded the bottom lands as to make most of the other sites in the vicinity inaccessible. This site was marginal to the basin and so easy of access. When the floods had receded, work was discontinued upon the site, and the crew moved to sites which could be reached only in the summer season in times of low water. It was expected that this site could easily be completed later when other lower sites had been inundated. The wisdom of this decision was demonstrated. When in March 1938 the water rose as a result of the early closing of Pickwick Dam and drove the crews from a number of sites on the lowlands, this site was still above high water for several weeks. During this period, its excavation was satisfactorily completed.

FEATURES

Aside from burials, there were 15 special features noted in this mound. Of these, 11 were clay areas which were distinctly different from the surrounding mound fill. Eight of these were small areas about 4 by 3 feet in size covered with puddled clay. There were no pits in association with them and no artifacts or bones near them, yet it is probable that these puddled-clay areas represent burials, possibly flexed burials, the skeletons of which had completely disappeared. Unless they were associated with burials the purpose of their construction is unknown. Of the remaining 4 special features, 2 were areas covered with charcoal. These may represent deposits of charcoal as the result of fire, or they may represent the slow decay of logs or bark used in some connection with the burial of bodies. The other 2 features are described in detail.

Feature No. 2.—At a depth of 7.7 feet below stake 45R4 there was found a section of a log 4 feet long by 1.3 feet broad. This was a hollow section, concave side upward. It appeared that a half log had been hollowed by burning out the center, as shown in plate 191, figure 1. After placement in the mound, the unburned portions had decayed leaving only the charcoal shell preserved. This seemed to have served in some way as a trough as one end of the hollow concave log had been dammed up with puddled clay which was worked to a surface and smoothed-off level with the sides of the trough.

Feature No. 5.—This feature consisted of three logs, the outer shells of which were charred. These logs lay parallel to each other at a depth of 8 feet. All of the logs were in the 45-foot cut nearly parallel to the 50-foot profile as shown in plate 192, figure 1. One log was about 13 feet long extending from 50L2 to 50R1. Parallel to it and separated from it about a foot was a short log about 4 feet long. Parallel to this log and touching it with their right ends together was a log about 11 feet long. Plate 192, figure 2, shows an end view of this feature. It was not possible to discern any purpose in the placement of these logs. It is possible that they may have been used as temporary cover for burial pits, or they may represent some kind of roof or structure erected over burials. It is difficult to escape the conclusion that they had some connection with the process of burial, since that seemed to be the sole purpose for the erection of mounds of this complex, and since similar logs have been found in other mounds of this type.

BURIALS

A total of 37 burials were reported from this site. Of these, 32 appeared to be extended and 5 were indeterminate. As is usual in burials of the copper-galena complex, the skeletal material has nearly disappeared in most burials. In many cases the positions of the body must be inferred from teeth caps, crumbled bone, position of artifacts, and the shape of the burial pit.

This site is so typical of the so-called Copena complex that it may be well to describe briefly the remains of each of these burials.

Burial No. 1.—This burial was in an oval pit 4.5 feet long by 1.6 wide, 6 feet below stake 35R3. There remained only the outline of the skull in crumbly bone near one end of the pit, and very nearby was found a greenstone celt about 6 inches in length.

Burial No. 2.—This burial lay in a pit 5.5 feet long by 1.4 feet wide, 6 feet below stake 35R1. There remained only an outline of the skull in crumbly bone, as shown in plate 190, figure 1, and three long bone fragments. These were so disposed as to indicate an extended burial. There were no artifacts in association.

Burial No. 3.—This was indicated by two fragments of long bones lying parallel to each other, with a ball of galena between, at a depth of 9.4 feet below stake 40L1. There were no indications of pit lines and the form of burial was thus indeterminate.

Burial No. 4.—This extended burial was in a long oval pit 6.3 feet long by 1.3 feet wide at a depth of 6 feet below stake 45R2, with fragments of long bones so disposed as to indicate an extended burial. There were skull fragments at one end of the pit, and chunks of foreign clay were scattered in the grave. A ball of galena was found in what was interpreted as about the position of the knees.

Burial No. 5.—This burial was in an oval pit 5 feet long by 2 feet wide, at a depth of 7 feet below stake 45R3. At one end of the pit was a small puddled-clay platform interpreted as a "pillow" upon which the head rested. Fragments of long bones were so disposed in the pit as to indicate an extended burial of a small person. A ball of galena was found near the head end of the pit.

Burial No. 6.—This burial was in a pit 6.5 feet long by 1.4 feet wide, at a depth of 6.9 feet below stake 45L2. Of what was thought to be an extended burial there remained only the outline of a skull with a few teeth caps. There was a puddled blue-clay lining of the grave about 1.5 inches thick which covered each end of the grave for approximately one third of its length. The central section had no lining. There were no artifacts in the pit.

Burial No. 7.—This burial was indicated by finding a very badly decayed separate skull at a depth of 8.5 feet below stake 40R3. There were no pit lines to be found and no other bones or artifacts.

Burial No. 8.—This burial pit was 6.2 feet long by 1.6 feet wide at a depth of 9 feet below 45L2. The long bones, which were in a very crumbled condition, were so placed as to suggest an extended burial. However, skull fragments were found near the center of the long pit which would seem to suggest that the skull had been detached at time of burial.

Burial No. 9.—This burial pit was 6.5 feet long by 2.3 feet wide, at a depth of 3.3 feet below 50R1. The bottom of the grave was covered with a layer of puddled blue clay upon which the body of a child had been extended. Only decayed fragments of the skull remained with a ball of galena nearby. Along both sides of the grave a line of charcoal extended for about 4 feet. This may have been formed by the slow decay of logs laid in the grave parallel to its length. There appeared to be no positive evidence that fire had been used in the grave pit.

Burial No. 10.—This was in a pit 7.5 feet long by 2.2 feet wide at a depth of 4.3 feet below stake 50R3. An extended burial was inferred. All that could be found, however, were three teeth caps near one end of the pit and close by two copper ear spools.

Burial No. 11.—This burial pit was 4.5 feet long by 1.5 feet wide at a depth of 6.3 feet below stake 50R3. In it were found a single long bone fragment badly decayed and a large ball of galena. An extended burial of a small person was inferred from placement.

Burial No. 12.—This burial was in a pit 6.5 feet long by 1.4 feet wide at a depth of 4.7 feet below stake 50R4. There remained only faint traces of long bones extended in the pit and at one end a single tooth cap surrounded by disintegrated bone. At the opposite end was a ball of galena and a small deposit of red ochre.

Burial No. 13.—This burial was in a pit 6.5 feet long and about 1.5 feet wide at a depth of 7.7 feet below stake 50L1. Under the head of the skeleton had been placed a puddled blue-clay "pillow" about 3 inches in thickness. The other end of the grave had been floored with clay upon which a fire had been burned until it was red and hard. Over this red burned clay a thin layer of sand had been scattered to partially cover fragments of charcoal. On this layer the body seemed to have been placed. The long bones remained in position, unburned, and well enough preserved to indicate an extended burial. The skull, in poor condition, was still in anatomical order. It is shown in plate 193, figure 1.

Burial No. 14.—This burial lay in a nearly rectangular pit 7 feet long by 2 feet wide. Traces of the long bones indicated an extended burial. This burial had rested on a puddled-clay layer covering the entire floor of the pit, as shown in plate 191, figure 2. At the head end, this clay layer had been folded over for a distance of about 1.6 feet to cover the skull completely and to encase it. With it was a ball of galena, in the puddled blue clay. While the skull had almost entirely disappeared by decay, its form was preserved in the clay. In this pit immediately above this burial, but not a part of it, was located feature No. 6.

Burial No. 15.—This burial was in a very large subhumus pit 9.7 feet long by 3.3 feet wide and 12.7 feet below stake 40R2. It is shown as pit No. 3 in the 40-foot profile. (See pl. 190, fig. 2.) On the bottom of this pit was spread a layer of blue puddled clay 0.4 foot thick which covered a rectangular area 6 feet long by 1.8 feet broad as shown in plate 193, figure 2. The walls of the pit extending into the subsoil were very true and vertical, and the bottom of the pit was flat. There remained no bones of any kind and no absolute proof that a body had ever been placed in the grave. However, an extended burial was inferred from pit form and artifacts. At an end of the pit were three large masses of galena, and at the other end an elevation of clay forming a clay "pillow." Near the center of the pit, resting on the puddled clay, in about the position of the breast of an extended burial, was a copper reel-shaped object.

Burial No. 16.—This burial pit was only 3.5 feet long by 2 feet wide at a depth of 2.6 feet below stake 55R3. At one end of the pit were fragments of skull, and near the other end a copper celt and one fragment of long bone. Attached to the celt was a section of woven matting well preserved. From the conformation of the pit and the placement of the bone fragment, the burial was deemed to have been flexed.

Burial No. 17.—This burial was inferred from the placement at the bottom of a pit 4.3 feet long by 1.6 feet wide of a layer of puddled clay. This layer was at a depth of 3.6 feet below stake 55L2. There were no artifacts and no bones present, but otherwise the puddled clay gave the appearance of a grave.

Burial No. 18.—This was in a pit 3 feet long by 1.4 feet wide at a depth of 3.1 feet below stake 55R3. At one end was found a single tooth crown, with four heavy copper beads—two of nugget type and two of rolled foil.

Burial No. 19.—In a pit 4.2 feet long by 2.2 feet wide at a depth of 4.5 feet below stake 55R2 was found a small patch of puddled clay. Nearby this clay was a ball of galena. There was nothing else to indicate the form of burial.

Burial No. 20.—This pit was 4 feet long by 2.2 feet wide at a depth of 4.1 feet below stake 44R2. At one end of the pit was a large flat limestone rock set on edge. At the other end was one long bone fragment much decayed. Covering the floor of this pit was a double layer of puddled blue clay. When the pit was opened this double clay layer was easily separated into two layers. There was nothing between them.

Burial No. 21.—This burial pit was 6.5 feet long by 1.8 feet at a depth of 7.5 feet below stake 35R3. The walls of the pit were very true and closely vertical, and the floor was covered with a layer of puddled blue clay carefully spread. This burial pit appears as subhumus pit No. 5 in the 35-foot profile. On top of the clay layer there were large sections of charcoal.

Burial No. 22.—This burial was in a pit very nearly exactly rectangular, 7.5 feet long by 2.6 feet wide at a depth of 11 feet below stake 45L1. This subhumus pit was very carefully dug. Only fragments of the skull remained. Nearby and scattered on the pit floor were large fragments of puddled clay. At the foot of the grave there were several large chunks of charcoal.

Burial No. 23.—This burial was in a pit 4.5 feet long and 1.8 feet broad at a depth of 4.5 feet. The bottom of the pit was covered with a layer of puddled clay on which was found near one end of the pit a human lower jaw and two copper ear spools. The jaw bone was much stained by the copper salts which had aided in its preservation. The end of this pit had been cut away by the later digging of a pit for burial No. 24.

Burial No. 24.—This was in an oval pit 6.5 feet long by 2.5 feet in maximum width, also at a depth of 4.5 feet. It contained only one decayed fragment of long bone and a ball of galena. Several large fragments of puddled clay were in the earth fill of this pit. These had been cut from the floor of the pit made for burial No. 23, which was thus precedent to it.

Burial No. 25.—This consisted of a nearly square-cornered rectangular pit 4.5 feet long by 1.6 feet broad at a depth of 5.2 feet below 55L4. This pit was floored with a heavy layer of puddled blue clay, and there were no bones and no artifacts. This is shown in plate 194, figure 2.

Burial No. 26.—This burial was very nearly a true rectangle, with vertical walls. It was 6 feet long by 1.7 feet wide at a depth of 6.5 feet below 55L3. The floor of this pit was covered with puddled clay which was laid very flat and smooth, and very carefully rolled at the edges into a border or cylindrical ridge about 0.3 foot in diameter, as shown in plate 193, figure 3. This border ridge followed the edge of the clay on both sides and ends. On the bottom of the grave near one end were found eight crowns of teeth.

Burial No. 27.—This pit was 3.5 feet long by 1.7 feet wide at a depth of 4.2 feet below 60R3. The pit floor was covered with puddled blue clay. On this clay was found a fragmentary skull badly decayed. At the other end of the pit were many large blocks of charcoal, but no evidence of burning in situ was to be found.

Burial No. 28.—This burial lay in a pit 5.5 feet long by 1.8 feet wide at a depth of 5 feet below stake 65L3. There were found bone fragments of skull and long bones badly decayed. Near the center of the pit large masses of charcoal had been placed. They seemed not to have been burned in the grave.

Burial No. 29.—In a pit of uncertain dimensions in the yellow clay of the mound, at a depth of 3.7 feet below stake 65R4, there were found a large mass of charcoal, and close by, many fragments of skull badly decayed. There had certainly been a burial pit here, but the walls were very little differentiated from the clay fill.

Burial No. 30.—This was represented by skull fragments found at a depth of 2.8 feet below stake 75R2. The pit cut into the yellow clay was filled with the same material, and the pit walls were not easily worked out.

Burial No. 31.—This burial was in a pit 7 feet long by 2.1 feet wide at a depth of 7 feet below stake 55L2. The body had been placed on the pit bottom where at one end skull fragments and caps of teeth were found. The lower half of the grave had been lined with bark before the body was laid in the pit. The body was then covered with a red puddled clay which was caused to conform to the shape of the extended body. When the grave was opened and this clay covering exposed, it was possible to trace the position of the body by the conformation of the clay surface.

Burial No. 32.—This burial was made in a very large oval pit, 8.5 feet long by 7 feet wide, and dug 7 feet below stake 55R4. In the center of this pit—made large perhaps to permit workers to enter it—a grave pit 7 feet long by 3 feet wide was dug about 2 feet deeper. In this pit an extended burial had been placed as shown by teeth caps, rib fragments, and skull fragments. On the breast had been placed a large copper reel. The whole burial had then been covered by a layer of puddled blue clay 2 inches thick. It appeared that a portion of the grave floor extending from head to hips had been covered by bark or other vegetative material.

Burial No. 33.—This burial pit was 5.5 feet long by 1.8 feet wide at a depth of 6.2 feet below stake 65L3. There was no evidence of the skeleton remaining, but near the center of this pit was a copper reel.

Burial No. 34.—This burial pit was 4.5 feet long by 1.7 feet wide at a depth of 5.8 feet below stake 65R1. The floor of the pit was covered with a puddled blue-clay layer, but no bones or artifacts appeared on it.

Burial No. 35.—This burial pit was 6.5 feet long by 1.5 feet wide. The pit proper was only 1.5 feet deep, but it was located 9 feet below stake 70L1. In one end of the pit were skull fragments and at about the position of the breast in an extended burial was found a very beautifully made copper, reel-shaped object.

Burial No. 36.—In a pit of uncertain dimensions at a depth of 8 feet below stake 70L3 there was found a fragmentary skull and a few fragments of long bone. The placement of the body was not possible to determine.

Burial No. 37.—This burial lay in a pit 6.5 feet long by 2.4 feet wide at a depth of 8 feet below stake 70R2. The skeleton was quite fragmentary but enough remained to show an extended burial. Near the head was a large block of galena. Near the center of the grave were six copper bracelets, and near the right lower leg was a large copper celt. The whole burial had been covered with a layer of puddled clay and on top of this a layer of bark or other vegetative material had been laid. After the passage of the body, the clay slumped leaving a depression on top of the clay covering. After sweeping out all contents of the pit, the clay floor with the six copper bracelets replaced is shown in plate 194, figure 1.

Summary of burial information

Total number of burials	37
Extended burials	29
Flexed burials	1
Undetermined disposition	7
Artifacts other than galena (in 9 graves)	17
Graves with puddled-clay bed	12
Graves with puddled-clay covering over body	4
Puddled clay used as a "pillow"	2
Total graves showing use of puddled clay	16
Evidence of fire in graves	2
Charcoal in graves	5
Galena balls (in 11 graves)	13
Stone celts	1
Copper celts	2
Copper ear spools (in 3 graves)	6
Copper beads (in 1 grave)	4
Copper reels (in 4 graves)	4
Copper bracelets	6
Red ochre occurrence	1

A local resident reports that at the time of the treasure-hunt excavation of this mound many pieces of galena were found, and many copper articles collected. He reports two to have been copper "hatchets." Circumstantial evidence of the truth of this report may be found in figure 55, which shows the burial distribution as revealed by this present investigation, superimposed on the ground plan of trench system.

This drawing shows the burials to extend from the 30-foot profile to the 75-foot profile on either side of the old trench which nearly reached bottom in the 65-foot profile, as shown in figure 53. It is highly probable that this trench cut through many burial pits and thus the report of the finding of galena balls and copper artifacts is not surprising. It is gratifying to find that the site was still able to furnish confirmation of so many of the traits of the Copena complex even after it had been subjected to partial excavation. It is believed that much of this information would not have been obtained except for the method used in excavation. Plate 188, figures 2, 3, and plate 189, which present the 40-, 45-, 50-, and 55-foot profiles, respectively, show how the burial pits are discovered, and each worked into a pedestal by removing the undisturbed subsoil about it, before it is cut down slowly by trowel and brush.

The complete removal of the excavated earth by barrows, made easy by this terrain, enabled the profiles to be completely cleared and permitted study of them for evidences of intrusion.

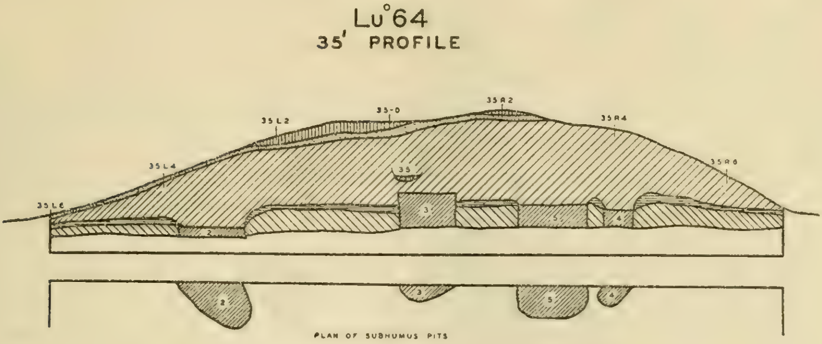

Lu°64
35' PROFILE
35 L 6
35 L 4
35 L 2
35-0
35 R 2
35 R 4
35 R 6
35
3
2
5
4
PLAN OF SUBHUMUS PITS

FIGURE 48.

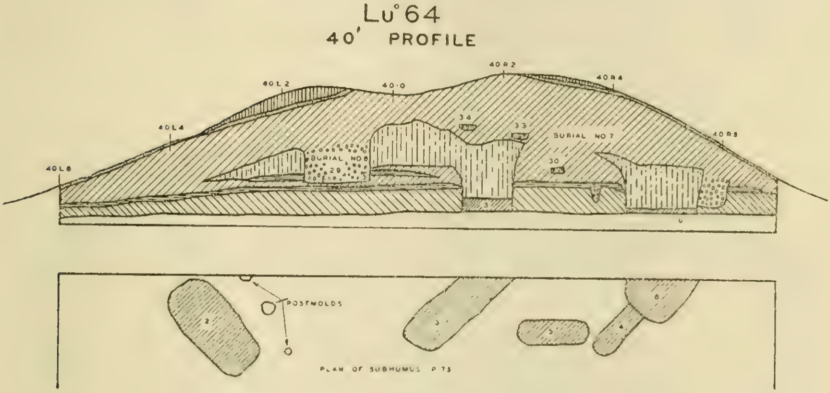

Lu°64
40' PROFILE
40 L 6
40 L 4
40 L 2
40-0
40 R 2
40 R 4
40 R 6
34
33
BURIAL NO 7
BURIAL NO 8
29
30
3
POSTMOLDS
2
5
4
6
PLAN OF SUBHUMUS PITS

FIGURE 49.

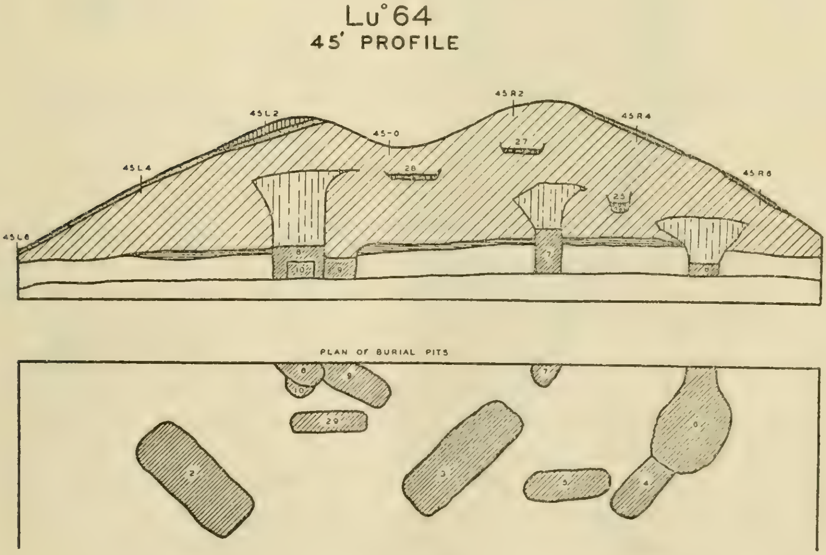

Lu°64
45' PROFILE
45 L 6
45 L 4
45 L 2
45-0
45 R 2
45 R 4
45 R 6
28
27
25
8
10
9
7
6
PLAN OF BURIAL PITS
29
2
3
5
4

FIGURE 50.

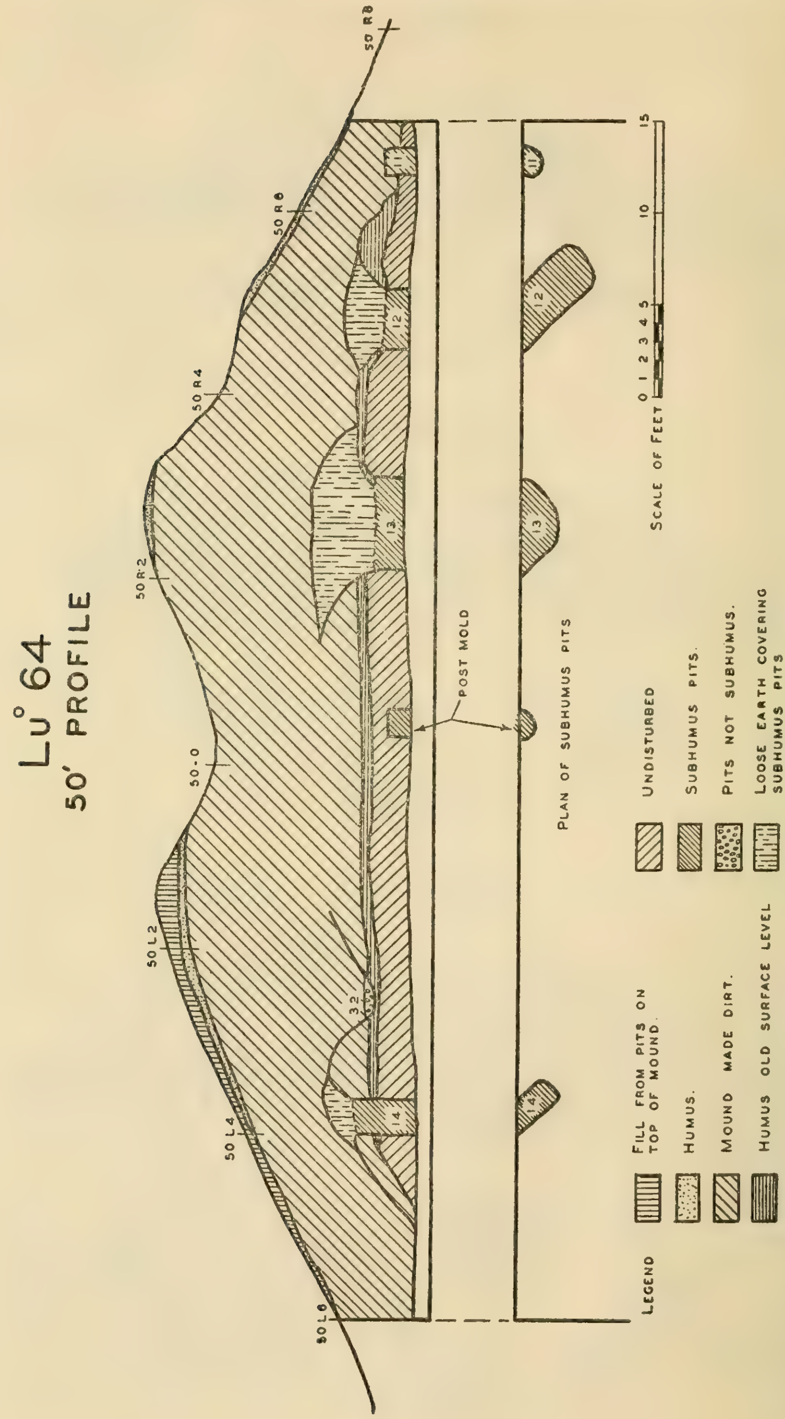

Lu° 64
50' PROFILE
50 R8
50 R6
50 R4
50 R2
50-0
50 L2
50 L4
50 L6
11
12
13
14
32
POST MOLD
PLAN OF SUBHUMUS PITS
SCALE OF FEET
0 1 2 3 4 5 10 15
LEGEND
FILL FROM PITS ON TOP OF MOUND.
HUMUS.
MOUND MADE DIRT.
HUMUS OLD SURFACE LEVEL
UNDISTURBED
SUBHUMUS PITS.
PITS NOT SUBHUMUS.
LOOSE EARTH COVERING SUBHUMUS PITS

FIGURE 51.

It is manifest that not all burial pits were subfloor pits, but many were intruded at varying depths. A study of the profiles, 35- to 75-foot, inclusive, which are presented in figures 48 to 54, inclusive, will demonstrate how burials were introduced at various times as the mound grew. The burial pit was probably opened in the face of the mound at need. The earth was thrown out and the grave probably lined with bark or woven matting, or puddled blue clay or all of them. The body was placed in the grave with its ornaments, most of which were probably perishable. Post molds and bark may indicate the erection of some kind of small and simple covering over the grave. Certainly the earth dug out to make the grave was not used to fill it. How long the grave remained open is a matter of conjecture, but when it was filled, new earth, usually different from the grave walls, was used to fill the pit and to build the mound slightly higher. It would thus appear that the mound grew by increments added as each burial was intruded into it.

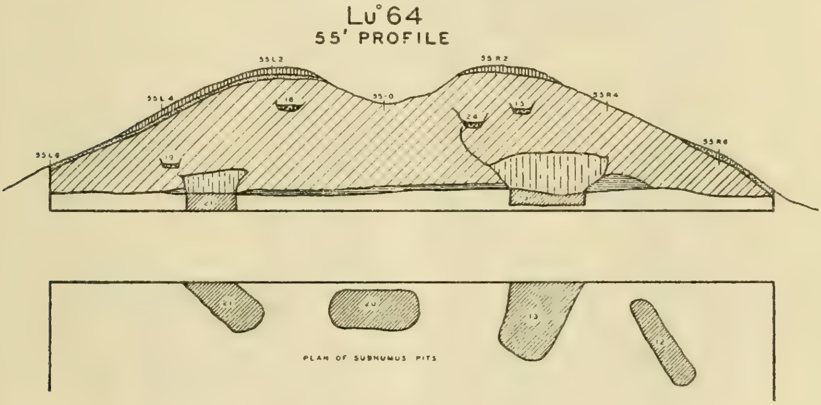


FIGURE 52.

ARTIFACTS

Plate 195, figure 1, and plate 197 show 17 chipped-flint points taken from the general digging; none were in association with any grave. In the lower right-hand corner of plate 195, figure 1, are shown two potsherds, plain and much weathered, with hole temper. These are assumed to be chance inclusions in the mound. There is also shown in this figure a broken blade of a sandstone spade.

Plate 195, figure 2, and plate 196, figure 2, present the four copper reels found in this mound. The one on the right in plate 196, figure 2, is unusually delicate and well made, while its companion is unusually broad. The reel on the left in plate 196, figure 2, is 4.9 inches broad across the line of perforations and its extreme diagonal length is 9.8

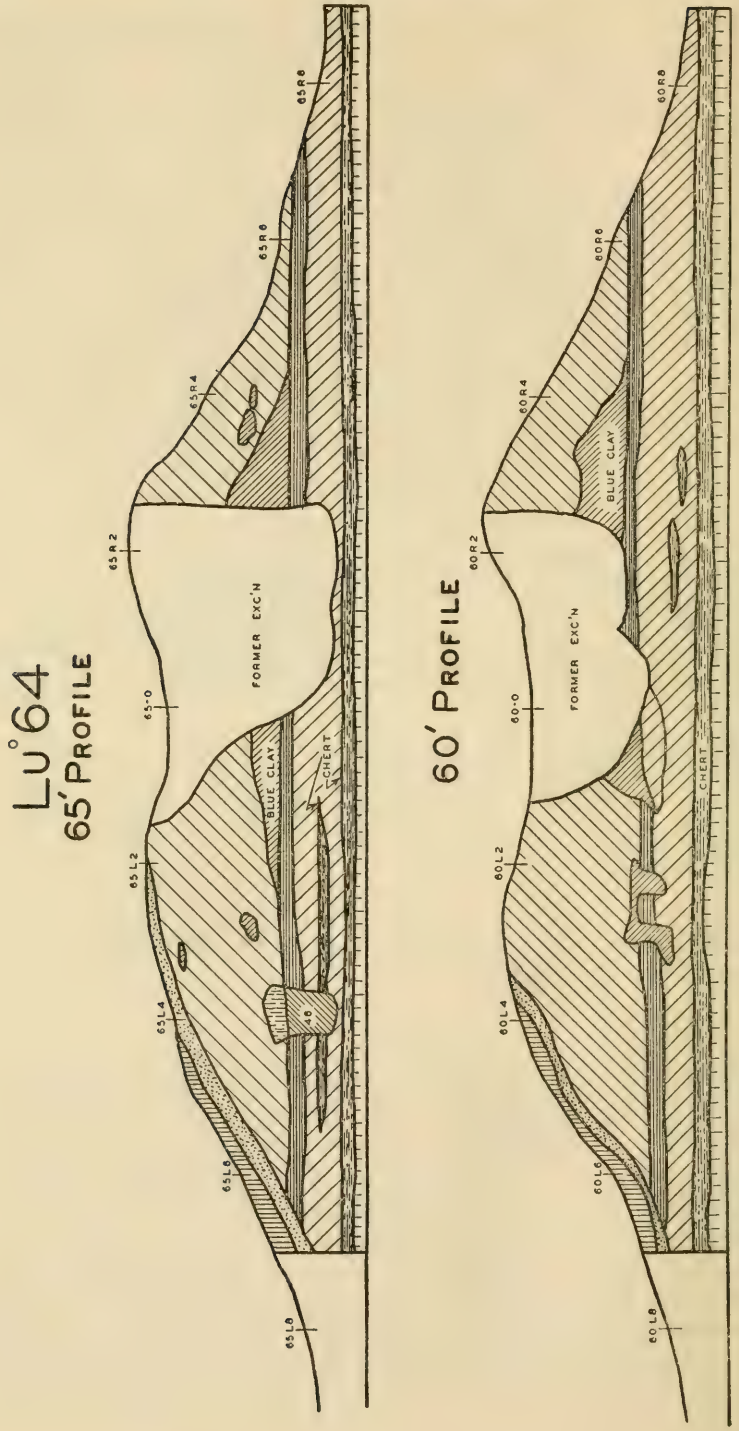

Lu°64
65′ Profile
65R8
65R6
65R4
65R2
Former Exc'n
65-0
Blue Clay
Chert
65L2
46
65L4
65L6
65L8
60′ Profile
60R8
60R6
60R4
Blue Clay
60R2
Former Exc'n
60-0
Chert
60L2
60L4
60L6
60L8

Figure 53.

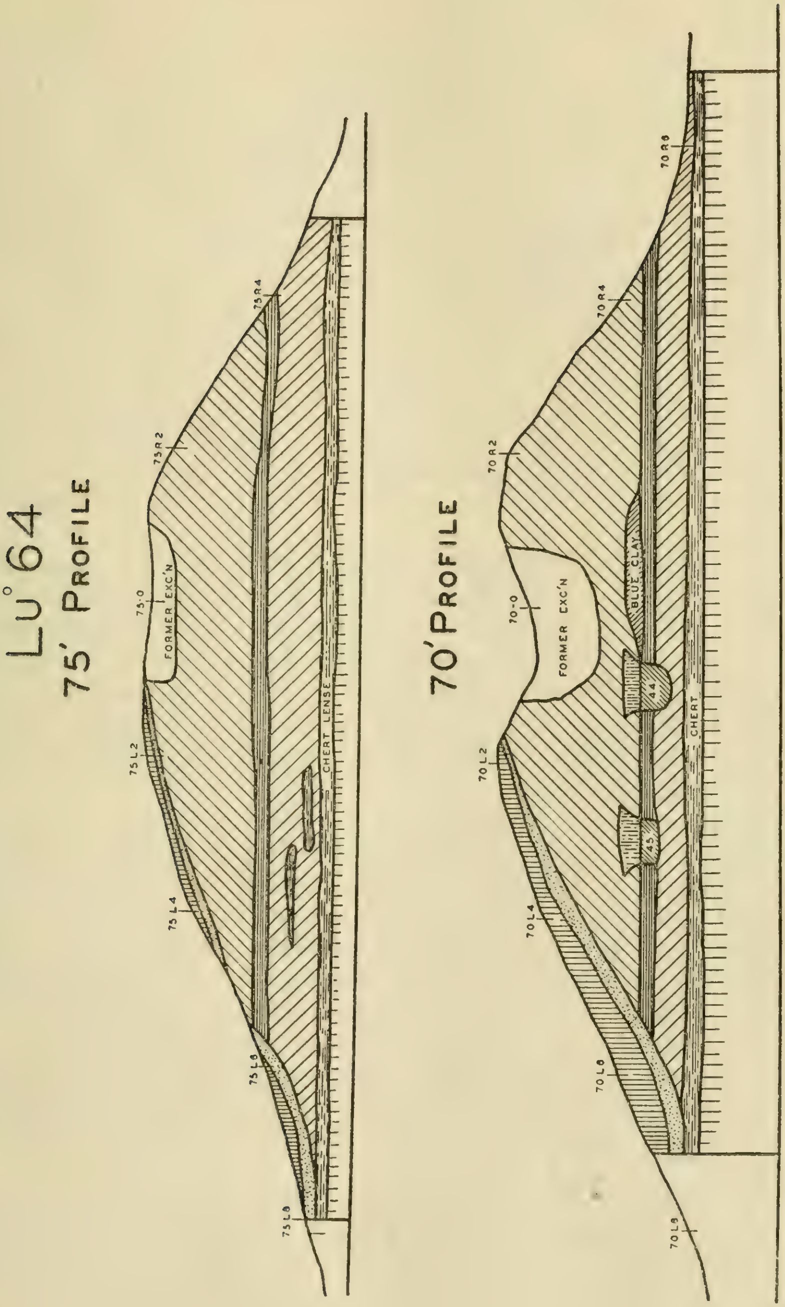

Lu°64
75' PROFILE
75R4
75R2
75-0
FORMER EXC'N
75L2
75L4
75L6
75L8
CHERT LENSE
70' PROFILE
70R6
70R4
70R2
70-0
FORMER EXC'N
BLUE CLAY
44
45
CHERT
70L2
70L4
70L6
70L8

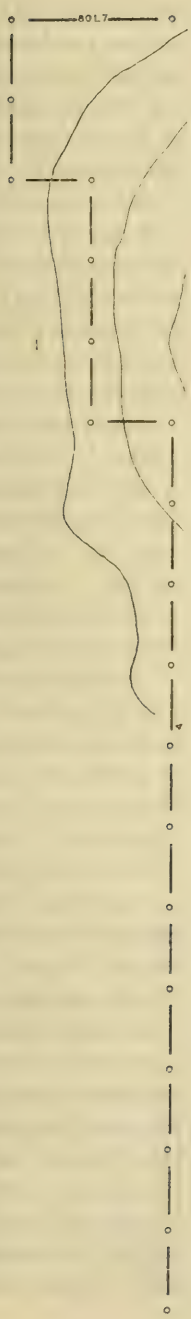
FIGURE 54.

inches. The companion reel is 2.8 inches across the line of perforations and has an extreme diagonal length of 8.9 inches. The extreme dimensions measured at the arm tips are: Length, 7.8 inches; and breadth, 4.8 inches. These reels, as well as the copper celt shown in plate 195, figure 2, very clearly show that they were not cut from heavy copper blocks, but that they were made from very thin copper sheets beaten and folded together. This copper celt is 7 inches long, 2.4 inches broad, and nearly 0.4 inch thick. The copper celt shown in plate 197, which is 3 inches long and 2 inches wide, is quite thin, and seems to have been beaten out from a single nugget. Some of these reels and the large copper celt show how the formation of copper salts has caused the successive layers of the copper to separate and reveal the method of construction. Some of the large copper beads are also made of rolled plate copper. The two large beads shown in plate 195, figure 2, had preserved sections of the rope on which they were strung. Attached to the copper celt shown in plate 197, was a section of preserved textile. This textile is shown on the right of the celt, and next to it is a section of preserved bark which also adhered to the copper celt.

The six copper bracelets from burial No. 37, shown in plate 196, figure 1, were also made from copper foil. The thin copper sheet seems to have been rolled on itself to make a solid rod about 9 inches long. The ends were cut squarely off, and this rod bent into a circular bracelet. They show considerable evidence of battering into shape—in one case some grinding is apparent. Grinding is also apparent on the blade of the copper celt; the intention seemingly was to produce a sharp edge.

The ear ornaments shown in plate 195, figure 2, and plate 197 are the usual double concave disks held together by riveting. Of the well preserved ear ornaments shown in plate 197, every one was wrapped with a twisted string about the stem. These strings were wrapped many times about the central rivet, and finally tied, evidently with the intention of preventing its removal. This suggests that the string formed a pad of soft packing between the copper ear ornament and the ear, and may have been used to prevent skin irritation incident to a heavy object, loosely supported. In one of these ornaments, the inside section was made quite flat and almost square, as if it was intended to aid in easy removal from an ear having a sufficiently large slit in it.

In the second row on the left of plate 197 is shown a small section of limestone, partially covered by a thin membrane. This was taken from burial No. 23. This stone lay directly under a copper ear ornament with the membrane between. This membrane is believed to be the remnants of a preserved human ear and a section of skin adjacent to it, which, because it was in contact with copper, did not


80L7
1
4

Lu°64

BURIAL PLAN

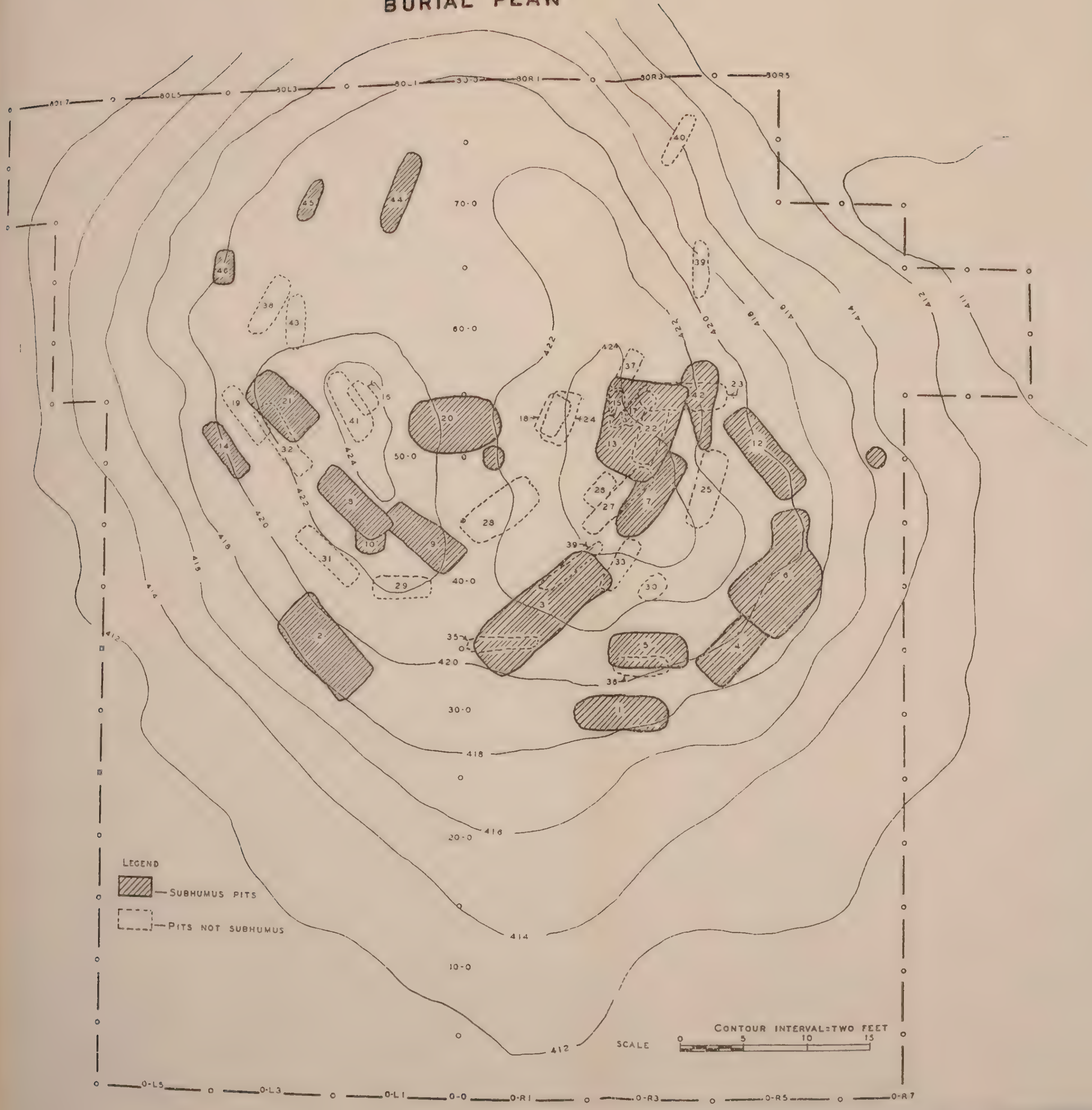

80L7
80L5
80L3
80L1
80-0
80R1
80R3
80R5
70-0
60-0
50-0
40-0
30-0
20-0
10-0
0-L5
0-L3
0-L1
0-0
0-R1
0-R3
0-R5
0-R7
424
422
420
418
416
414
412
411
1
2
3
4
5
6
7
9
10
12
13
14
15
16
17
18
19
20
21
22
23
25
26
27
28
29
30
31
32
33
35
36
37
38
39
40
41
42
43
44
45
46
LEGEND
SUBHUMUS PITS
PITS NOT SUBHUMUS
CONTOUR INTERVAL=TWO FEET
SCALE
0
5
10
15

FIGURE 55.

decay. In the lower left of plate 197 are shown three galena balls of the type usually found in such associations.

WRIGHT VILLAGE, SITE LU^{v} 65

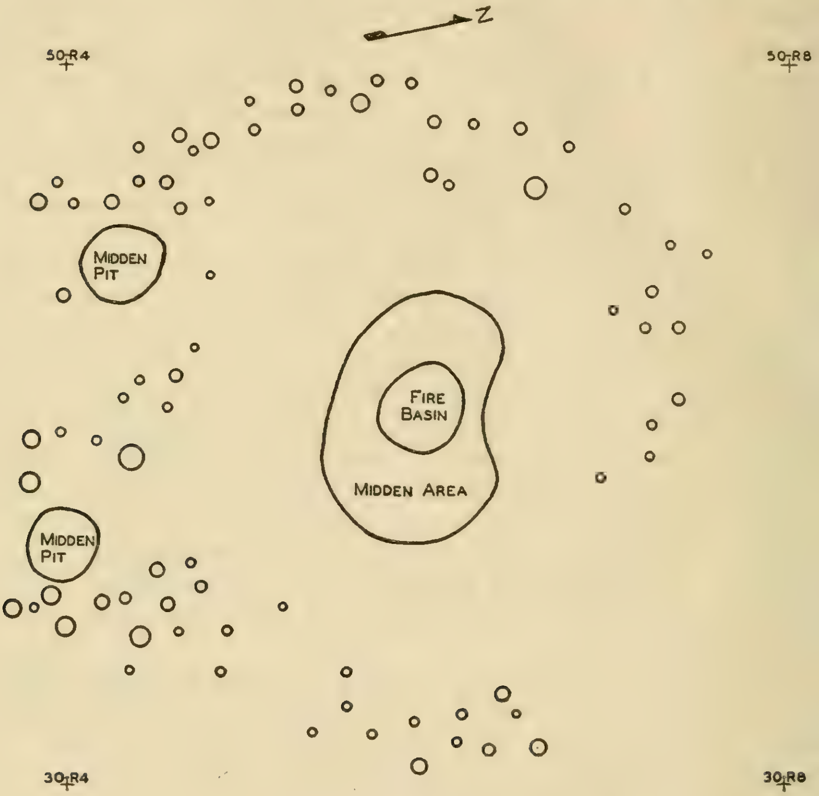
This site is also on the farm of D. J. Edwards on the Florence-Waterloo road, and is about 600 yards east of two earth mounds of the copper-galena complex, sites Lu° 63 and Lu° 64. It was a small village site on a slightly elevated ridge in the level bottom land, its presence being manifested by an abundance of shell in the soil, which was much darker than that of the surrounding field. The whole area had been in cultivation for some time, certainly for the last 16 years, the last crop on it in the summer of 1936 being cotton. The site is shown in plate 198, figure 1.

The differentiation of the village soil from the remainder of the field was easily observed by noting the difference in the growth of the cotton on the area. Besides shell in the dark soil, there was a considerable admixture of broken chert, with some charcoal potsherds, and flint chips. A few greenstone celt fragments were found on the surface. Under ordinary circumstances this village would have been considered too small to warrant investigation. However, it was determined that this site should be excavated owing to its proximity to sites Lu° 63 and Lu° 64, which were found to belong to the Copena complex. At the time of excavation no village unquestionably belonging to this complex had been discovered. It was hoped that it might prove to be the habitat of the builders of the two earth mounds in its vicinity.

An area 70 by 25 feet was staked and carefully investigated in 5-foot squares, shown in plate 198, figure 2. Lateral exploratory trenches were run from this area to determine the extent of the village. It was found that the midden deposit was not very deep nor very extensive. The dark soil, only about 1 foot deep, was easily separated from the heavy clay subsoil. Owing to very shallow plowing for cotton (only about 3 inches) the lower portion of this midden soil had not been disturbed by cultivation.

One of the outstanding features of the site was the large number of midden pits which had been dug into the subsoil, and which were easily detected by difference in color and texture of earth. Pits to the number of 66 were found in the area excavated. They were generally very nearly circular in form, varying from 2 to 5 feet in diameter and penetrating into the subsoil to depths of from 0.6 to 2.6 feet. The majority of the pits were about 3 feet in diameter and 1.5 feet deep. Most of them were filled with the usual soil of the village. Plate 202, figure 1, shows pit No. 3, with potsherds in the bottom associated with charcoal. The pit was 2.6 feet in diameter and 1.3 feet deep. Plate 202, figure 2, shows the appearance of pit No. 17

before it was excavated and plate 203, figure 1, shows it after excavation. It contained two lapstones and some large potsherds. So large a number of pits in so small a village would seem to suggest that the dwellers here had much need for storage facilities. Another important feature in this small village was the circular post-mold pattern shown in plate 199, figure 1. Within this pattern were two midden pits, as shown in plate 199, figure 2, and a central fire basin. This basin had been later filled in and a burial had been made in it.



Post Mold Pattern-Feature 2

Lu^{v}65

Figure 56.

The pattern of the molds evidently indicates a circular structure, but the outline is somewhat ragged due in part to the fact that a part of the circular pattern is missing. It is probable that in this section of the pattern the molds did not extend into the subsoil, and may have been cut away, as all of the molds of this dwelling were very shallow. Figure 56 is a drawing showing the exact location of the molds in this pattern.

There appeared no definite prepared floor for this structure which lay in the center of a midden area. In the center of this area and in a pit at a depth of about 1.4 feet was a circular fire basin shown in plate 201, figure 2. This basin, with flat bottom and vertical sides, had a distinct well-formed clay rim, and contained much broken stone showing the effect of fire, as illustrated in plate 201, figure 1. Immediately over this fire basin and in a somewhat larger fire pit of oval form, a burial had been made. This completely flexed burial, on left side, is shown in plate 200, figure 1. Since it was definitely over the fire basin shown in plate 200, figure 2, and about 1 foot above it, its placement was possible only after the discontinuance of the use of this basin.

Portions of a second burial were found in a pit in the village site. These consisted of parts of the skull and lower legs, badly decomposed. Only enough remained to suggest a flexed burial in a shallow circular pit, 1.5 feet deep.

ARTIFACTS

Besides pottery fragments, including two pieces of wattle-work wall, and flint chip, the following summary of artifacts found in the general digging gives a slight picture of the culture of the people of the site:

Bone needles and awls	6
Antler drift	1
Antler spear point	1
Small greenstone celts	6
Fragments of greenstone celts	11
Greenstone spade	1
Lapstones	2
Anvil stone	1
Pottery gamestones	2
Incised disk of cannel coal	1
Broken 2-hole bar gorget	1
Small copper fragment	1
Flint projectile points	342

The greenstone celts are shown in plate 203, figure 2. They vary in length from 3¾ to 5½ inches, and are thus much smaller than are usually found in Copena sites.

The greenstone spade shown in the same figure is 10⅛ by 4 by ⅞ inches. It is polished by considerable use. Plate 204, figure 1, shows an anvil stone, a small lapstone, a broken stone gorget, two pottery gamestones, and bone and horn artifacts.

FLINT PROJECTILE POINTS

In this village site the flint artifacts were gathered in 3 levels. Before excavation, the surface was carefully searched and all material gathered as a surface collection. The village was then excavated to hardpan which meant searching a layer from 9 inches to 1 foot thick, the upper 4 inches of which had been disturbed by shallow cultivation. The removal of this top soil revealed 66 shallow pits dug into the hardpan. The contents of these pits was collected separately from that of the village site. The following table (21) shows the distribution of the 342 flint projectile points as to type and depth.

TABLE 21.—*Distribution of flint projectiles as to type and depth*

Type No.	Collected from—			Total
	Surface	Village site	Pit areas	
	Number	*Number*	*Number*	*Number*
23	47	25	10	82
37	43	33	19	95
2	33	25	25	83
Miscellaneous [1]	34	23	25	82
Total	157	106	79	342

[1] Includes 7 miscellaneous types.

It is thus apparent that the dominant types are type Nos. 23, 37, and 2. Type 23 is a large flint blank, generally roughly chipped, and of but little diagnostic importance. However, type 37 is definitely the characteristic Copena type, some of the most perfect specimens of this type having been taken from deep burial pits on Copena sites, in particular, site Hn° 4. Here, associated with type 37, is a small triangular point, type 2. It occurred not only on the surface, but also in the village and in the pits in about the same proportion. It is evidently to be regarded as associated with type 32 from which it does not differ very greatly, and, perhaps, may be properly regarded as a Copena point, although its occurrence on the other sites of the Copena Focus has been rather rare. However, it has been found at site Hn° 4 and site Lu° 63. Plate 207, figure 2, shows a few of the miscellaneous flint forms. The lower row of this figure presents specimens of type 37 which are considered typical Copena points of the cruder forms. Plate 207, figure 1, presents in the top and central rows a variety of these broken points of type 37. The lower row of this figure shows the variation in type 2 at this site. It is interesting to note the specimen in the upper left-hand corner. This has the large longitudinal flake thrown off on both sides after the manner of the Folsom point.

POTTERY

The study of the pottery from this site shows 50 percent of all the pottery to have been recovered from pits throughout the general excavation. The pottery from the pit is not different in distribution or in types from material recovered elsewhere on the site. Further, the so-called "hole"-tempered pottery is found proportionately in the pits and within general digging.

A careful examination of all the sherds of "hole"-tempered ware (here designated as type 6) reveals all the holes examined to be angular and irregular in outline. Further, every sherd that showed "hole"-tempered surface appearance, yet still retained some tempering material within the unweathered portion of the sherd, revealed this tempering material to be crushed limestone. There were no exceptions to this. Again, the surface designs common to the "hole"-tempered ware are duplicated on the limestone-tempered ware. This evidence apparently indicates that nearly all, if not all, the "hole"-tempered sherds are to be considered as bleached crushed limestone-tempered sherds. The combined number of "hole"-tempered and limestone-tempered sherds equals 97.4 percent of all sherds from this site. These are shown in plate 204, figure 2, and plate 205.

SAND-TEMPERED POTTERY

Sand-tempered sherds number only 62 from the site, but the ware is a well constructed, carefully formed pottery. Seven rim sherds show the vessels to be either straight-sided, beaker-shaped jars, or bowls with flaring rim and rounded lip. Textile-impressed sand-tempered sherds (type 21) occur here and at no other investigated site in the Basin. The textile is plain plating technique with wide warp and close weft. The rim sherds with cord impressions (type 21) show a very fine twisted cord was used. These rim sherds have a series of cord impressions running parallel to the lip and closely spaced. Others, from straight-sided beakerlike vessels, have designs formed by short crossed impressions of cords, and one rim of this latter type was perforated at 0.4 inch below the lip.

The paste of this ware is either black or buff of medium texture. Hardness is from 2 to 2.5. The sand grains are clear and white.

LIMESTONE-TEMPERED POTTERY

Herein the "hole"-tempered ware is treated with the limestone-tempered pottery as it is believed to be this type. Unweathered sherds of limestone-tempered ware show the tempering material to be a crushed crystalline white limestone of medium fine to medium paste. The color of the paste is black to gray with a red inner surface of buff on gray. Hardness varies from 1.5 to 3.5.

The sherds show a wide variety of surface designs, and of the total sherds seven different treatments are found here, as illustrated in plates 205 and 206, figure 1. Many of the rim sherds show the rim to have an added outer strip about 0.8 inch wide—these on vessels of a wide, slightly flaring mouth. Large sherds of this ware are of vessels approximately 18 inches in diameter and of a deep, urn shape. A portion of a large, round-base, incised vessel occurred on the site and the many pot legs found were, perhaps, from four-legged, flat-bottomed vessels as all bases found with legs or feet were of this type.

Clay-Grit-Tempered Pottery

Forty-eight sherds of this ware were found on site Lu^{v} 65. Of this number two were rims of straight-sided vessels with no surface decoration. All the body sherds were plain undecorated fragments.

The ware is of black paste of fine texture with hardness of 2.5.

CONCLUSIONS

It would appear for a consideration of the stone artifacts as well as the pottery that this site may properly be regarded as a village site of the Copena Focus, but that fact is by no means fully established. This village was in the immediate vicinity of two mounds of the Copena Focus, which would suggest association. However, in no other site known to be of the Copena Focus has pottery been found which was similar to the sherds from this site. Since no other village of the Copena Focus has yet been discovered, there remains nothing to which the trait list here may be compared.

Long Branch, Site Lu° 67

This site is in Lauderdale County, Ala., on the right (north) bank of the Tennessee River, about 14 miles west of Florence, Ala., near the post office of Wright. It is 1 mile N. 80° E. to site Lu° 63 and 1.9 miles S. 30° E. to Lu° 59. The site extends approximately 300 feet E.–W. and 200 feet N.–S. It lies on the immediate bank of the Tennessee River, and its top rises some 15 feet above the surrounding flood plane. This flood plane is cut by a winding slough which empties into the Tennessee River adjacent to the site. For a long time the surface of the mound has been cultivated in corn, hay, and cotton. All the timber was cut by the Basin Clearance Division of the Tennessee Valley Authority just before the excavations were started, but many large stumps of gum, maple, and hickory were apparent. The general topography of the site is shown in figure 57.

Figure 57 also shows the area of this site excavated. The zero datum line was laid off nearly due east and west. Excavated earth was carried to the east side of the mound in wheelbarrows and dumped into the ravine which was about 14 feet deep at that point. Plate 208, figure 1, shows the eastern end of the first 5-foot trench cut down to undisturbed soil and the huge pile of shell removed forming a talus on the eastern slope of the mound. Plate 208, figure 2, shows the eastern end of the trench system after the trench was widened to 20 feet. During the very hot summer of July–August 1936, the profiles were found to dry very quickly, and became, as a consequence, very difficult to read. It was found desirable to prevent excessive drying by shading the profile with burlap, as shown in plate 208, figure 2.

The mound was staked in the usual 5-foot squares and cut down in 1-foot levels. Plate 210 shows methods of excavation and illustrates the variation in shell concentration in the different natural zones.

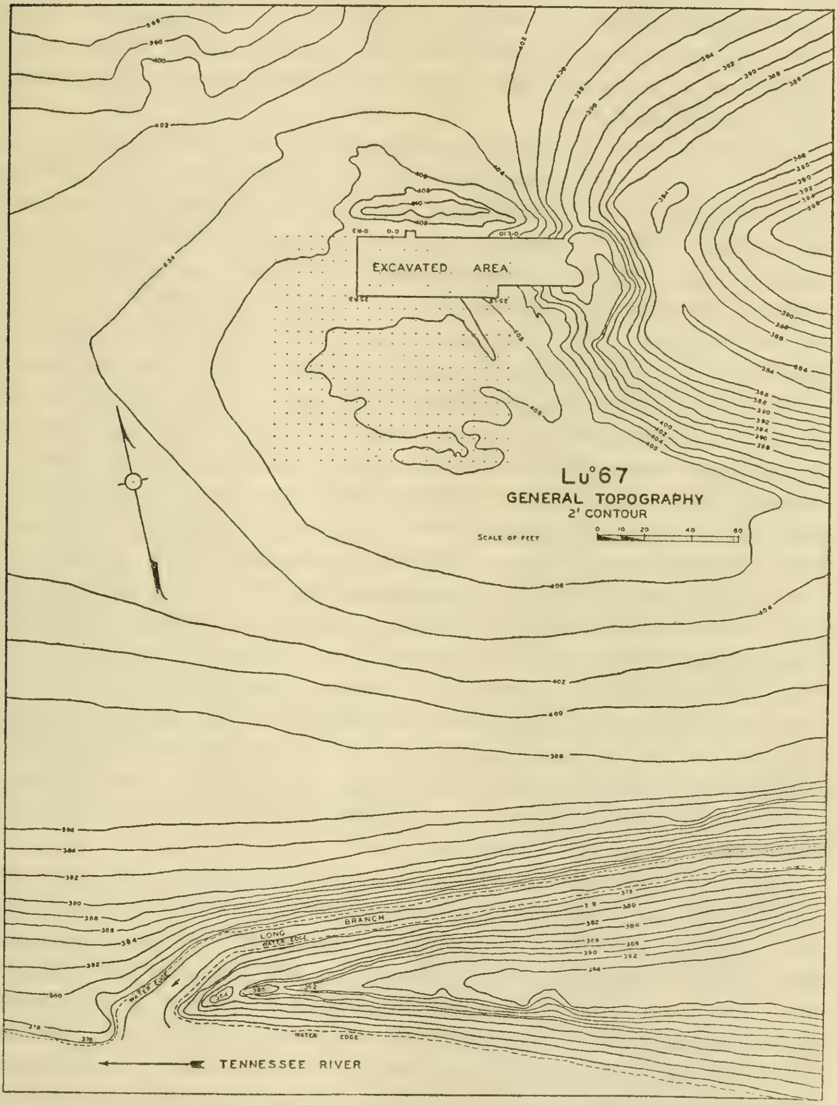

EXCAVATED AREA
Lu°67
GENERAL TOPOGRAPHY
2' CONTOUR
SCALE OF FEET
0 10 20 40 60
LONG BRANCH
WATER EDGE
WATER EDGE
TENNESSEE RIVER

FIGURE 57.

The mound, made by the deposition of midden material, mostly shell, has accumulated to a depth of about 11 feet at this site. It is obviously a habitation site and camp debris is mixed with the shells which occur in great variety. The evidences of the occupancy of the midden area for dwelling sites are numerous, as shown by crude hearths or fire basins, and a few scattered post molds. Scattered through the shells are many river pebbles, broken by the action of fire. Aside from the burials, which are numerous in the mound, old occupational levels are indicated by layers of foreign clay which were brought upon the shell heap from time to time. Upon these clay layers fires were made and in places the clay was hard-burned. (See pl. 219, fig. 2.)

While in general the shell matrix packed down and tended by the action of water to be cemented together and become a fairly solid mass, yet there was in prehistoric times much digging into the lower layers from above. This was done for purposes of burial, and sometimes it appears that "clam bakes" in "barbecue holes" were in vogue, as described by Fowke (1928, p. 440) (see pl. 209, fig. 2). This digging, together with continued occupancy on such sites, caused the shell to slip at the edges of the mound and resulted in considerable erosion and redeposit of material. It was not uncommon to find burials intruded into the mound edge, which were broken into two portions and separated several feet from each other as the result of this slipping. Such action results in the destruction of any stratification which may have existed near the mound periphery, but one is not surprised to find very definite stratification in the interior portions. This stratification of mound material is shown in plate 209, figure 1, where zones A to E have been separated by stretching strings on a profile from 25R4 to 0R4 which was 10 feet deep. The difference in the zones consisted in general of changes in density of the shell content, or a change in the dominant species in the zone, as well as changes in the relative density of the black midden earth which contained varying amounts of sand, clay, and broken river pebbles.

Figure 58 is a drawing of the 15-foot profile from L9 to R3 which shows zones A to E. These may be described as follows:

Zone A.—This zone contained the only potsherds in the mound—all were in the upper 30-inch layer. In the squares 20L7 and 20L8 in the eroded portion of the mound a few sherds occurred as low as 3 feet. This is ascribed entirely to erosion. In the body of the mound only 7 out of a total of 991 sherds were found lower than 24 inches—these, at depths of 3 feet, certainly may be ascribed to original disturbance and to accidents in collecting. The intrusive burials were found in the upper half of this zone. These have mortuary vessels all of which were shell-tempered ware with smooth finished surface.

Zone B.—This zone contained few shells, but had a large amount of clay and ash. Inclusive burials were numerous, and many were intruded into it from the lower levels of zone A.

Zone C.—This zone was characterized by a considerable shell density. Many shells were from small gastropods.

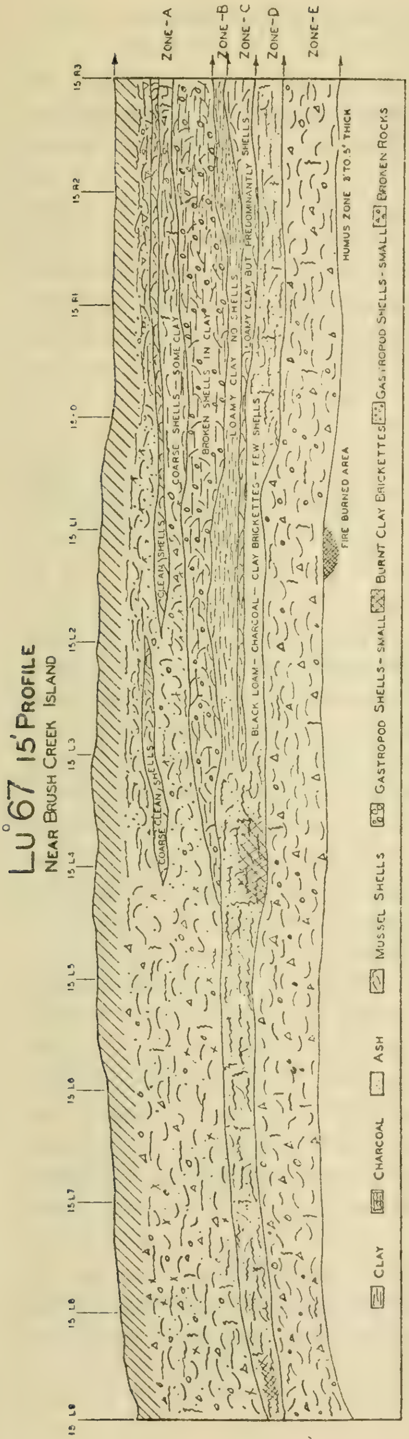

Lu°67 15' Profile
Near Brush Creek Island
Zone-A
Zone-B
Zone-C
Zone-D
Zone-E
15 R3
15 R2
15 R1
15 0
15 L1
15 L2
15 L3
15 L4
15 L5
15 L6
15 L7
15 L8
15 L9
Clear shells
Coarse clean shells
Coarse shells - some clay
Broken shells in clay
Loamy clay - no shells
Loamy clay but predominantly shells
Black loam - charcoal - clay brickettes - few shells
Humus zone 3" to .5' thick
Fire burned area
Clay
Charcoal
Ash
Mussel shells
Gastropod shells - small
Burnt clay brickettes
Gastropod shells - small
Broken rocks

FIGURE 58.

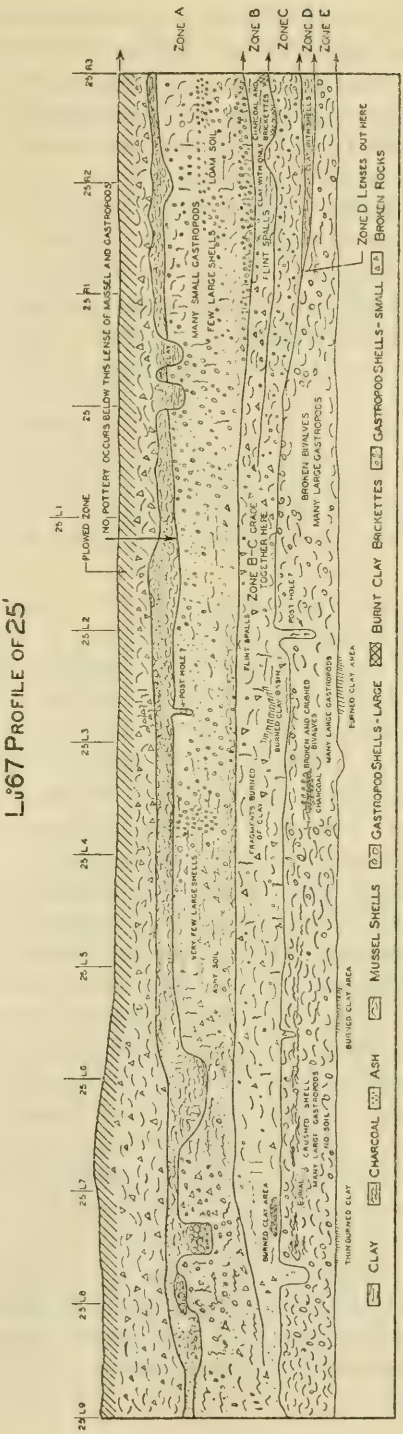

Lu°67 Profile of 25'
Zone A
Zone B
Zone C
Zone D
Zone E
25 R3
25 R2
25 R1
25
25 L1
25 L2
25 L3
25 L4
25 L5
25 L6
25 L7
25 L8
25 L9
Plowed zone
No pottery occurs below this lense of mussel and gastropods
Many small gastropods
Few large shells
Loam soil
Charcoal and clay with only brickettes
Flint spalls
Clay with shells
Zone D lenses out here
Zone B-C grade together here
Broken bivalves
Many large gastropods
Post hole
Post hole?
Flint spalls
Burned clay basin
Fragments burned of clay
Broken and crushed bivalves
Charcoal
Many large gastropods
Burned clay area
Very few large shells
Ashy soil
Burned clay area
Burial & crushed shell
Many large gastropods
No soil
Burned clay area
Thin burned clay
Clay
Charcoal
Ash
Mussel shells
Gastropod shells - large
Burnt clay brickettes
Gastropod shells - small
Broken rocks

FIGURE 59.

Zone D.—This zone contained much ash and clay with some shell, and had scattered inclusive burials in it.

Zone E.—This is composed of clean shell, with no soil. There were no burials in this zone except a few which were definitely intruded from zone D. It rests on undisturbed sandy soil which shows no evidence of man's occupancy.

In figure 58 it is to be noted that zone C is "pinched" out and that zones B and D come together in this profile from L4 to L9.

Figure 59 shows the 25-foot profile just after the removal of the 20-foot cut. This shows how zones B and C merge in 25L1 and how zone D pinches out in 25R1. The significance of these zones is discussed under stratigraphy.

FEATURES

While the chief interest in shell middens may attach to the large number of burials included in the shell, other important evidences of occupancy are presented in varied features found through the midden.

Feature No. 1.—This was a cache of jasper spalls near a patch of charred grass at a depth of 7 feet in square 10.0. The cache of spalls is shown in plate 218, figure 1. All are small, thin, and of the same material. Some of the spalls show secondary chipping and all show conchoidal fractures. There was no evidence of a floor or any structure.

Feature No. 2.—At a depth of 8.7 feet in square 10L14 an elliptical area 3 feet by 4 feet was burned. (It contained a patch of small pebbles of chert stained red, and over all was charcoal, and fragmentary burned and unburned bones, and charred antler.) In this zone the percentage of clay is larger, but there was no evidence of a prepared floor. The patch of small pebbles may be the result of burning a chert conglomerate cemented by ferruginous sand. The action of fire would further oxidize the sand and give the pebbles a red color.

Feature No. 3.—This was a circular midden pit with a diameter of 36 inches to 38 inches, at a depth of 9.2 feet in square 10L6. The pit depth was 1.5 feet. It contained two flat stones set on edge, as shown in plate 213, figure 2. Otherwise the pit was completely filled with shell. A few fragments of terrapin were the only bones found in the pit. At a depth of 10 feet immediately under this pit, was a layer of burned clay and much charcoal. Although paired valves were common among the shells in the pits, none of them were charred. (See pl. 213, fig. 1.)

Feature No. 4.—This was a circular basin 30 inches in diameter and 4 inches deep at the center in the original hardpan under the mound in square 5L7. This basin contained mussel and snail shell, but showed no evidence of fire.

Feature No. 5.—A cache of jasper spalls was found at a depth of 7 feet in square 20R1. This cache covered a circular area about 1.5 feet in diameter and was similar to feature No. 1.

Feature No. 6.—At a depth of 6 feet in square 20L1, a definite layer of clay had formed a fire basin which showed the effect of fire to a depth of 4 inches. This layer had later been dug into and in part broken up by mound occupants to such an extent that its original form and dimensions were not determinable. A longitudinal section is shown in plate 219, figure 2.

Feature No. 7.—This was a large layer of wood ashes containing no bone laid at a depth of 3.3 feet in square 20L5. Immediately below this ash was a layer of large bivalves, many of which were still paired. This feature is shown in plate 209, figure 2, in profile.

Another general feature of this site was the presence of occasional dog burials. These were not always in definite association with human burials but often were so closely placed to burials that association seemed certain. Plate 219, figure 1, shows such a burial of a dog.

BURIALS

The burials at this site, like those in most shell mounds, were of many forms. While a great variation of burial forms in shell mounds seems typical, yet it is possible to observe certain types of burials which recur quite often, and which are quite uniform within the type. The types, in order of their frequency of occurrence at this site, may be designated (1) round grave, (2) partially flexed, (3) extended, (4) cremation.

Round graves.—The round-grave type of burial is by far the most numerous. This grave consisted of a circular pit dug just large enough to receive the body, which was flexed and bent, and apparently had been thrust into the particular pit dug to receive it. The diameter of such pits is often not much over 2 feet and the depth of the pit is usually about 1 foot. The pit was very nearly circular, with vertical walls. Due to the long occupancy of the shell mounds as places of residence, many of the burials suffered postburial disturbance and the form of the pit was marred and often the outlines were obliterated. However, in a total of 92 burials, 43 were definitely determined to be round-grave burials. The placement of the body in the round grave usually followed one of three forms. The most frequent disposition of the body in the pit was in the fully flexed position usually on the left side. This type is shown in plate 214, figure 3. The knees were drawn up near the chin and the arms were closely flexed with the hands near the face. This type of burial differed from the simple, fully flexed burial, since here the vertebral column was bent to conform to the curve of the grave. Thus, the head was bent forward nearly to touch the knees. It was conceivable that the body before deposition in the round grave was encased in wrappings of skins or textiles and tied in this form to make easy its placement in the small, round grave; or it may have been placed in the grave and forced to conform by bending the vertebral column and using extreme flexure of body as well as the limbs. In any case, the body fitted the grave pit very closely. This will be designated as type 1a.

Of 43 round-grave burials, 29 were of this type. Occasionally the disposition of the arms in this type of burial showed individual variation as in plate 214, figure 2, but the body was closely flexed, usually on the side.

Plate 214, figure 1, shows this same pit before it was excavated. The feet of this burial, No. 58, were so elevated in the pit that the feet were exposed on the pit rim before the pit was cleared.

Two stages of burial No. 73, which was also a typical round-grave burial, are shown in plate 216.

A second manner of placement of the body in round-pit burials was that in which the body, fully flexed, was placed on the back. This type, shown in plate 212, figure 2, resulted in a very closely packed skeleton, which, except for placement, differed little from the fully flexed burial on the side. The chief difference to be noted is that in this type, since the bottom of the grave was flat, the vertebral column was comparatively straight. Eleven of the 43 round-grave burials were of this type. This will be designated as type 1b.

A third form of round-grave burial occurred frequently enough to suggest that it is a type and not the result of accident or whim. In this burial, the body was placed face downward, the arms flexed under the body, and the legs completely flexed but spread one to each side. This type is shown in plate 211, figure 2. Because the position of the bones of the skeleton closely paralleled the position of those of a frog in the sitting posture, this type was given the not inappropriate designation of "frog burial" by the supervisor in charge of this site. It was evident that in this type the body had been intentionally placed face downward, and the legs were spread to make them conform to the circular pit. In 43 pit burials, 3 were definitely of the "frog" type. This will be designated as type 1c.

Twelve burials are designated as partially flexed. This type, designated as type 2, is shown in plate 212, figure 1. The legs were bent at the hip with the thighs placed approximately at right angles to the body; the feet were well drawn up till the heels were near the pelvis. The pit, or grave, dug to receive these bodies was not circular and in general had no definite form, but it varied from the rectangular with rounded corners to the elliptical or triangular. A modified form of this type of burial is shown in plate 215, figure 3.

Four burials were classified as extended. One of these was fully extended on the back, type 3a, shown in plate 215, figure 1, but the other three were extended to the knees. The lower limbs were either closely flexed backward against the thighs or were folded over on top of them, type 3b. (See pl. 211, fig. 1.) Such positions possibly could be attained by cutting the ligaments at the knees to allow reverse flexure.

There were found four deposits of charred human bones, evidently representing the deposit of cremated remains. There was no evidence of cremation in situ. These were designated as type 4. Such a burial, No. 66, is shown in plate 217, figure 1.

Ten burials were in such condition, as the result of postburial disturbance, that no exact classification was possible. There were 10 infant and 7 child burials, which were not considered in the classification as the remains were fragmentary and the disposition was uncertain.

Summary of burials

Type:	*Number*
1a, round grave, fully flexed on side	29
1b, round grave, fully flexed on back	11
1c, round grave, face down, "frog type"	3
2a, partially flexed on back	12
2b, partially flexed on face	3
3b, extended, lower limbs bent back	3
3a, fully extended	1
4, cremations	4
Disturbed	10
Infant	10
Child	7
Total	93

Within this group of 93 burials, 4 skeletons were found headless. Two of these skeletons were fully flexed in round graves, 1 was a frog burial type 1b, and 1 was an extended burial with lower limbs bent back. These burials showed no evidence of postburial disturbance, and one must conclude that the heads had been removed prior to burial.

A study of the vertical distribution of these burial types did not reveal any significant association of burial types with any natural zones or cultural stratification, except that very few burials of any kind occur in zone E. This fact may be explained in part in the following ways:

a. People living on this mound from its base to its top may have practiced many forms of burials at all times.

b. If there were any special burial forms used at particular stages of the mound development, the record may have been obscured by the fact that a burial belongs to that level from which the grave was originally intruded. In the shell mounds it was very difficult to discern the origin of grave pits, and nearly impossible to determine to what level a burial properly belongs.

Thus, while burial types may have no special diagnostic significance in relation to associated cultural complexes, it was nevertheless convenient to designate these types occurring in shell mounds (as indicated in the "Summary of burials" on page 185) in order to avoid repetition of burial descriptions.

And further—in the mortuary offerings accompanying these burials—it was possible to detect stratigraphy as discussed later.

It was quite apparent that the inclusion of artifacts in burials in general was not customary. In 93 burials, 67 showed no associated artifacts of any kind. Most of the remaining 25, described in order, had only the simplest ornaments, shell or bone beads, and shell pendants. If we excluded bone and shell beads and pendants, only 6 out of 93 burials showed any stone or pottery artifacts intentionally included.

Burial No. 2.—This was a typical "frog" burial of a young adult in B level. On top of the skull, which lay face downward, was a single long bone bead.

Burial No. 3.—This burial, a completely flexed burial of a child in B level at a depth of 6 feet, was so poorly preserved that the bones had almost disappeared. Along its vertebral column was a double row of large circular shell beads, evidently having been strung as a single strand.

Burial No. 8.—This was a typical round grave with the skeleton fully flexed on its back at a depth of 6 feet. On the right arm was found a bone awl.

Burial No. 9.—This was a partially flexed burial 3.5 feet below stake 0L2 in zone A, with which were found a shell gorget, shell beads on the pelvis, and a block of blue clay on the feet.

Burial No. 10.—A partially flexed burial was located 4.1 feet below stake L12. There was a stone bead on the pelvis and a long shell bead near the chin.

Burial No. 12.—A partially flexed burial was found with shell pendant and a string of shell beads near the chin.

Burial No. 17.—At a depth of 4 feet below stake 10L10, extending 6 inches into the top of level B, was a circular pit about 1 foot in diameter, which was filled with small human bone fragments all more or less charred and mixed with charcoal and ashes. In this matrix were found shell beads cut longitudinally from small shells, long cylindrical shell beads made from the central columella of marine conchs, and two stone beads. None of the beads showed any effects of fire and could not, therefore, have been associated with these bones when they were burned. This was definitely a deposit of the residue of a cremated body which was burned elsewhere. Seemingly, after the cremated remains had been gathered up, the beads were added, and all were mixed together before being deposited. The beads showed no effects of fire.

Burial No. 19.—At a depth of 5.7 feet below stake 10L3 was found a skeleton which had suffered postburial disturbance due to shifting of shell near the mound periphery. It was not possible to determine original placement of bones. The skull was crushed. On top of this burial were three long, bone, awl-like implements lying parallel to each other. These are shown in plate 231. All three are thin-walled bones much curved and obviously are wing bones of a large bird. Two are ulnas and one a humerus. These were sent to the National Museum and were identified by Dr. Wetmore as belonging to the trumpeter swan, *Cygnus buccinator*.

Burial No. 24.—This burial was a round-grave type, fully flexed on its back, at a depth of 6 feet in square 5L7. About the neck was a string of five long cylindrical beads, three of which were shell and two of jasper.

Burial No. 27.—Below stake 10R1 this extended burial was found in a pit which had been dug completely through the shell midden and extended a few inches into the undisturbed mound floor to a depth of 10.7 feet. Due to previous disturbances, it was not possible to determine from what level this burial had been intruded. Extended to the knees, this burial had the lower limbs closely drawn up with the heels to the pelvic region. At the feet were two flint projectile points and a perforated antler implement.

Burial No. 29.—This burial of a child was fully extended at a depth of 6 feet below stake 15L11. At the left elbow was found a flint projectile point, and about the neck was a string of long cylindrical shell beads, and two jasper beads of similar shape.

Burial No. 32.—This was a completely flexed burial on the side in a round grave at a depth of 4.3 feet below stake 10L6. About the neck of this burial was a string of 5 jasper and 10 shell beads.

Burial No. 33.—At a depth of 5 feet below stake 10L2, was an elliptical pit containing this skeleton partially flexed. Under and about the ribs were found 160 beads made from cutting small gastropod shells (*Anculosa* sp.). About the neck were 177 small beads, 7 large gastropod shell beads, and a small shell pendant. (See pl. 212, fig. 1).

Burial No. 34.—This partially flexed burial at a depth of 6 feet below stake 10L1, was notable only in that the head of the skeleton was missing. There was no evidence of postburial disturbance which seemed to force the conclusion that the head was removed before burial. It is shown in plate 212, figure 1.

Burial No. 36.—This burial at a depth of 6.4 feet below stake 10L6 was a typical "frog" burial in a round grave. It showed no postburial disturbance, and was notable only in that the head of the skeleton was absent.

Burial No. 38.—At a depth of 6 feet below stake 10L9, was found burial No. 38—a typical "frog" form. This burial had no artifacts, but immediately adjacent to it, as shown in plate 211, figure 2, was a deposit of cremated remains of another individual designated as burial No. 38A. These charred bone fragments consisted of skull fragments, foot bones, and splinters of long bones. All were heavily burned; some to the point of calcination. With these charred bones were found 9 small, thin, shell, disk beads, 3 shell pendants well shown in plate 211, figure 2, 140 small shell beads, 734 split gastropod beads (*Anculosa* sp.), 3 worked shell fragments, 2 jasper beads, and 1 bead made from a crinoid stem. These artifacts lay upon, within, and beneath the charred bones, and were evidently mixed with the bone fragments when deposited. However, none of these artifacts showed any effect of fire in themselves.

Burial No. 39.—At a depth of 6 feet below stake 10L6, was found a deposit of charred fragments of skull and other bones mixed with unburned bone fragments. The bone fragments which showed the effect of fire were not surface charred but were burned completely through. There was no evidence of a cremation in situ, which seemed to suggest that this was a deposit of cremated remains burned elsewhere. The observable fragments, however, represented only a small portion of a single individual.

Burial No. 46.—At a depth of 8 inches below stake 20 was found the skull of an infant deposited in a small shell-tempered pottery vessel. This vessel is shown in plate 215, figure 3.

Burial No. 50.—The skeleton of a child, fully extended, was found at a depth of 2 feet below stake 15L5. At the left arm was a group of 10 bone pendants made from the leg bones of turtle (*Chelydra* sp.).

This burial was in a pit which had been intruded from zone A into the B–C–D–zones. At a depth of 5.2 feet below 20L8 the bottom of this circular pit was found covered with a layer of about one-eighth of an inch of fine-grained charcoal. Some of this may have been wood or bark, but a part of this charcoal gave the impression of decomposed leather.

Burial No. 60.—With this infant skeleton, fully flexed on the side at a depth of 5.2 feet below stake 20R1, were nine shell beads and one cylindrical stone bead found at the neck.

Burial No. 70.—Within 7 inches of the surface at stake 25R2 a disturbed infant skeleton was found near a large potsherd. This sherd was a rim sherd with a strap handle. Both the pot and the skeleton had been much damaged by the plow. A drawing reproduction of this pot is shown in plate 230, figure 1. It had a height of 9 inches, a mouth diameter of 10 inches, and a maximum diameter of 12 inches.

Burial No. 71.—Near stake 25R1 a pit had been dug from the surface through zone A to a depth of 3.2 feet. The body of an infant had been placed in a partially flexed position with small shell beads at the neck. The pit had then been filled with clay in which there was no shell.

Burial No. 75.—This burial was a round-grave burial fully flexed on its back. It was notable only because the skull was missing, but the grave showed no indication of postburial disturbance. The pit, which was 4.5 feet below stake 25L7, was covered over with a pile of large stones loosely laid. (See pl. 218, fig. 2.)

Burial No. 76.—This round-grave burial with the body fully flexed on its side was at a depth of 5.3 feet below 20R2. Between the chin and the knees was a pile of small shell beads.

Burial No. 78.—This burial of a partially flexed skeleton of a small child at a depth of 5.4 feet below stake 20L4 had a single red stone bead.

Burial No. 80.—This was a round-grave burial fully flexed on its side at a depth of 5.1 feet from stake 25L7. With this burial were found some shell beads and a circular notched shell pendant.

Burial No. 81.—This burial, shown in plate 217, figure 2, was a round grave with the body flexed on its side. It was at a depth of 5.6 feet below stake 25 and was exceptional in the number of artifacts in association. These consisted of numerous oval and triangular small shell beads, 4 shell clothespins, 2 large cylindrical shell beads, 39 shell pendants, 1 bone awl, 1 expanded cylindrical "banner stone," and 2 horn atlatls. The face was turned downward so that the dorsal aspect of the vertebral column was uppermost. A breech clout could be partially traced in this burial. It shows in plate 217, figure 2, near the elbows and below. This suggested that the large shell pin may have been accessory to this garment.

Burial No. 87.—This round-grave burial was of the fully flexed type on its side. It was at a depth of 6.7 feet below stake 25L5. In association were two *Terrapene* carapaces, one of which enclosed a hammerstone.

Burial No. 91.—This partially flexed burial was found in square 5R4 at a depth of 3.5 feet. This square was outside the designated excavation, but burial was discovered during the taking of shell samples from the boundary profile for study in conchology made by the Smithsonian Institution. This burial is notable in that on the left arm was found a single copper bracelet, as shown in plate 229, figure 2. This is the only evidence of copper found at this site.

ARTIFACTS

It was early observed in the excavation of this site that the occurrence of artifacts showed stratigraphy. Potsherds occurred to any extent only in the upper 2 feet of zone A. Flint was most numerous in the upper 5 feet and bone artifacts predominated in the lower levels. Such observation encouraged the careful collecting of material from the uneroded portions of the mound and from sections which showed a minimum of disturbance. The selection of such a section was not always easy, due to the great variety of agencies operating to "fog" the record of stratification. However, it had been found possible to demonstrate that there was stratigraphy in the deposition of artifacts at this site, and as a result, to work out groups of associated traits which seemed to define the cultural complex responsible for each separable zone. Artifacts were described, therefore, in the discussion of the level of their occurrence.

10 FOOT CUT	20 FOOT CUT	TOTAL
35	52	87
28	34	62
27	36	63
37	40	77
20	23	43
34	14	48
18	19	37
4	11	15
4	3	7
4	2	6

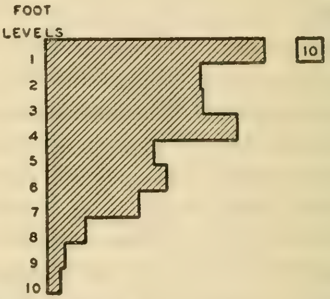


FIGURE 60.—Distribution of the total flint complex from the 10- and 20-foot levels, site Luº 67.

FLINT ARTIFACTS

The flint artifacts from this site, for the purpose of study, were selected from three 5-foot cuts. The 10-foot cut extended from L10 to R1, the 15-foot cut from L10 to R3, and the 20-foot cut from L8 to R3 inclusive. The 10-foot cut was taken down in 1-foot levels, the 15-foot cut was taken by natural zones, and the 20-foot cut was taken in 6-inch levels. In a classification of this flint material some 50 types were recognized. The selection of these types was rather arbitrary, the purpose being to obtain forms easily recognized and which could be accurately counted, and to enable a study of stratification to be made. These forms are shown in plate 226, figure 2, and plate 227.

The distribution of flint artifacts was made by counting the various types found in each level in each 5-foot square. Tables 22, 23, and 24 record this data.

Figure 60 shows the distribution of the total flint complex from the 10- and 20-foot cuts. This would indicate that here very little flint was used in the early stage of the occupancy of this site, but that after zone E (an almost sterile layer of shell approximately 2 feet thick had been laid down) the use of flint had increased steadily, and had reached a maximum at the top or 1-foot level. In some cases this increase in use was indicated by the increased occurrence of an individual type and also by the appearance of new types at higher levels not found in lower levels. Some types began to be used in the early stages of the midden and increased gradually to the top, while others, beginning later, reached a maximum occurrence and then quickly became obsolete. Such stratification was not difficult to observe as indicated by the data resulting from a statistical count of flint artifacts from this site, but in view of the very considerable amount of disturbance always observable in shell mounds, the discovery of stratification of artifact types was considered little short of remarkable.

TABLE 22.—*Distribution of flint types in 10-foot cut by 1-foot levels*

Type No.	Zone									
	A					B	C	D	E	
	Foot level									
	1	2	3	4	5	6	7	8	9	10
1	1	--------	1	1	1	4	4	--------	1	2
2	1	--------	--------	--------	1	1	--------	--------	--------	--------
3	1	--------	--------	--------	--------	2	1	--------	--------	--------
4	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------
5	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------
6	5	2	--------	3	2	1	--------	--------	--------	--------
7	--------	2	1	--------	2	1	1	1	1	--------
8	1	1	1	--------	1	--------	--------	--------	--------	--------
9	--------	--------	--------	--------	--------	1	--------	--------	--------	--------
10	--------	--------	1	1	--------	--------	--------	--------	--------	--------
11	1	--------	--------	--------	--------	--------	--------	--------	--------	--------
12	--------	1	1	--------	--------	1	1	--------	--------	--------
13	1	2	--------	--------	--------	--------	--------	--------	--------	--------
14	--------	--------	1	--------	--------	--------	--------	--------	--------	--------
15	1	--------	--------	--------	--------	--------	--------	--------	--------	--------
16	--------	--------	--------	2	--------	--------	--------	--------	--------	--------
17	1	2	1	2	4	1	--------	2	--------	--------
18	--------	1	--------	1	--------	--------	--------	--------	--------	--------
19	3	--------	--------	2	--------	1	--------	--------	--------	--------
20	--------	1	--------	--------	--------	2	1	--------	--------	1
21	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------
22	3	5	6	4	--------	1	--------	--------	--------	--------
23	7	1	3	1	1	4	--------	--------	--------	--------
24	2	1	--------	--------	--------	1	--------	--------	--------	--------
25	2	--------	3	12	3	--------	3	--------	1	1
26	--------	2	5	6	1	1	--------	--------	--------	--------
27	2	3	--------	--------	--------	--------	1	--------	--------	--------
28	1	1	--------	1	2	1	--------	--------	1	--------
29	1	1	--------	--------	--------	--------	--------	--------	--------	--------
30	--------	--------	--------	1	1	4	2	--------	--------	--------
31	--------	1	--------	--------	--------	--------	--------	--------	--------	--------
32	--------	--------	--------	--------	1	2	--------	--------	--------	--------
33	--------	1	2	--------	--------	--------	--------	--------	--------	--------
34	--------	--------	--------	--------	--------	2	1	--------	--------	--------
35	1	--------	1	--------	--------	--------	--------	--------	--------	--------
36	--------	--------	--------	--------	--------	1	--------	--------	--------	--------
37	--------	--------	--------	--------	--------	1	1	--------	--------	--------

TABLE 22.—*Distribution of flint types in 10-foot cut by 1-foot levels*—Continued.

Type No.	Zone									
	A					B	C	D	E	
	Foot level									
	1	2	3	4	5	6	7	8	9	10
38						1	1			
39										
40										
41										
42										
43										
44										
45										
Total	35	28	27	37	20	34	17	3	4	4

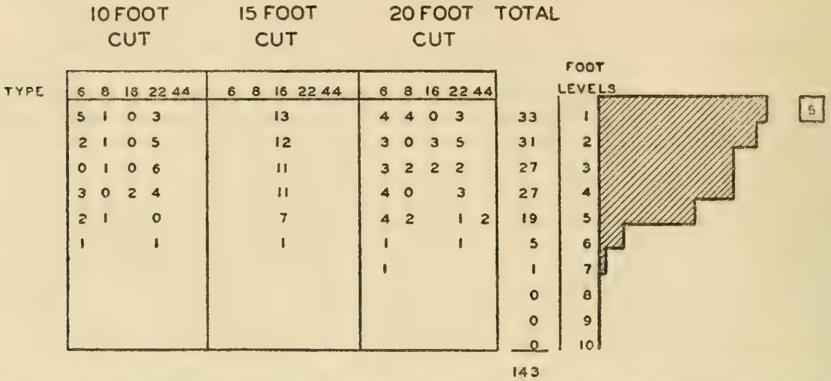
TABLE 23.—*Distribution of flint types in 15-foot cut by zones*

Type No.	Zone				
	A	B	C	D	E
1	3	1	2	5	3
2	3		1		
3	6		2	1	
4					1
5	1				
6	11				1
7	3	1	1		4
8	4				
9	2	1			
10		1	1		
11	1				
12	2				
13	25		3	2	
14	10		1		
15	5				
16					
17	10		4	2	
18	2	1			
19	6				
20	6	1			
21					
22	33	1			
23	15	2	1		
24	2			1	
25	5	2		3	3
26					
27	4	1			2
28	9	1	1	4	1
29	15	1	1	3	3
30		4	1	2	
31					
32					
33	2				
34	1	2	5	1	
35	2				
36					
37	5		1		1
38	3	3	1	1	
39					1
40	1				
41					1
42	1		2	1	
43				1	
44	6				
45	6				
Total	210	24	27	27	21

TABLE 24.—*Distribution of flint types in 20-foot cut by 6-inch levels*

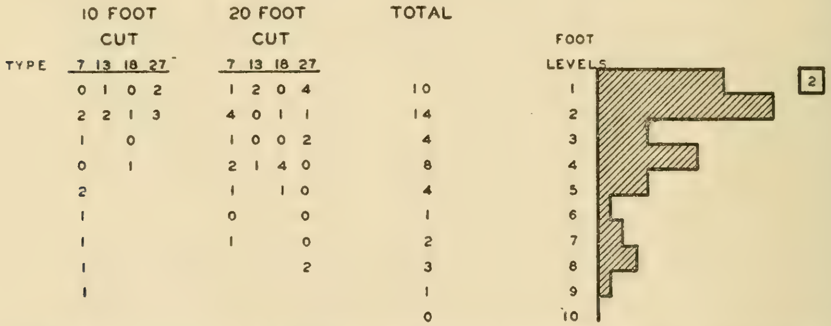
Type No.	Zone																					
	A									B		C		D		E						
	Foot level																					
	½	1	1½	2	2½	3	3½	4	4½	5	5½	6	6½	7	7½	8	8½	9	9½	10	10½	11
1	1			1								4	4	1	3			1				
2																						
3																						
4	1					1				1												
5		1																				
6	1	3	1	2	2	1	3	1	4		1			1								
7	1		3	1	1		1	1	1					1								
8	3	1				2	6		1	1												
9																						
10							1	1	1		1											
11	3	3		1										1								
12			1	1																		
13		2						1														
14	3		1	1																		
15		2	1	1																		
16			2	1	1	1																
17							1	1	3			1										
18				1				4		1												
19			1		1	1		1	1													
20					1	2									1							
21		1																				
22		3	1	4		2	3			1		1										
23	3	6		1	9	1	3	1														
24	2		1					1														
25	1			1			2					2			1							
26	3	2	3	2	1	5	2	2	4	1			1		2							
27	1	3		1		2									1	1						
28	1				1	1																
29	1										1		1					1				
30													2	1								
31																						
32											1		1									
33								1	1													
34												2	4									
35								1														
36																						
37								1														
38																						
39							1												1	1		
40																						
41														1		1						
42															1			1				
43																						
44									1	1												
45																						
Total	25	27	15	19	17	19	23	17	17	6	4	10	13	6	9	2	0	3	1	1	0	0

By reference to plate 227, figure 2, it may be noted that types 6, 8, 16, 22, and 44 have a general similarity of form. Figure 61 shows the distribution of the 143 specimens of these types. None of them occurred in zone E or zone D, and only one was found in zone C, and 5 in zone B. It must be apparent that 4 feet or more of this shell midden was laid down before these types began to appear in the B zone. In the A zone, which was 5 feet thick, this group steadily became more numerous to the top. By reference to plate 227, figure 1, it will be seen that types 7, 13, 18, and 27 were very similar and might well have been regarded by their makers as of the same form. Figure 62 shows the depth distribution of important types from the 10- and 20-foot cuts. These types, which have only a very slight occurrence below zone A, seemed to reach a maximum in the upper 2 feet of zone A, the regions in which the pottery appeared.



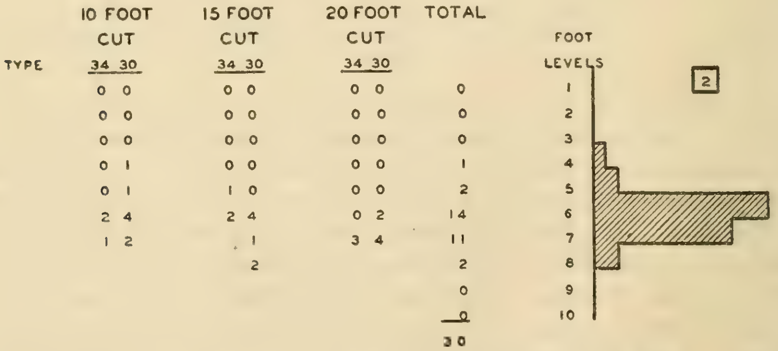
	10 FOOT CUT					15 FOOT CUT					20 FOOT CUT					TOTAL	
TYPE	6	8	16	22	44	6	8	16	22	44	6	8	16	22	44		FOOT LEVELS
	5	1	0	3				13			4	4	0	3		33	1
	2	1	0	5				12			3	0	3	5		31	2
	0	1	0	6				11			3	2	2	2		27	3
	3	0	2	4				11			4	0		3		27	4
	2	1		0				7			4	2		1	2	19	5
	1			1				1			1			1		5	6
											1					1	7
																0	8
																0	9
																0	10
																143	

Figure 61.—Distribution of slender-stemmed flint projectiles as represented by types 6, 8, 16, 22, and 44, site Lu° 67.



	10 FOOT CUT				20 FOOT CUT				TOTAL	
TYPE	7	13	18	27	7	13	18	27		FOOT LEVELS
	0	1	0	2	1	2	0	4	10	1
	2	2	1	3	4	0	1	1	14	2
	1		0		1	0	0	2	4	3
	0		1		2	1	4	0	8	4
	2				1		1	0	4	5
	1				0			0	1	6
	1				1			0	2	7
	1							2	3	8
	1								1	9
									0	10

Figure 62.—Distribution of stemmed, broad, short projectile points as represented by types 7, 13, 18, and 27, site Lu° 67.



	10 FOOT CUT		15 FOOT CUT		20 FOOT CUT		TOTAL	
TYPE	34	30	34	30	34	30		FOOT LEVELS
	0	0	0	0	0	0	0	1
	0	0	0	0	0	0	0	2
	0	0	0	0	0	0	0	3
	0	1	0	0	0	0	1	4
	0	1	1	0	0	0	2	5
	2	4	2	4	0	2	14	6
	1	2		1	3	4	11	7
				2			2	8
							0	9
							0	10
							30	

Figure 63.—Distribution of flint types 30 and 34, site Lu° 67.

A very distinctive notch and base were represented by types 30 and 34. (See pl. 227, fig. 2.) These types differed from each other only in size. Their occurrence is shown in figure 63. Here it was quite evident that the form began somewhere in the upper portion of zone D, reached a maximum in zones C–B, and then was very abruptly discontinued in the lower portion of zone A. No specimen of this type was found in the upper 3 feet of this zone. This upper 3 feet of midden carried all of the pottery, none being found below that level. It seemed evident that on this site types 30 and 34 represented a prepottery type of projectile point, and also equally evident was the fact that the group of types 6, 8, 16, 22, and 44 was used by the pottery makers. Since this group of types began at the bottom of zone A, 5-foot level, and continuously increased to the top, it would suggest that zone A was laid down by a single people who had no pottery in their early occupancy of this site while laying down the lower 3 feet of zone A. But this people began to acquire pottery, while residing at this site, and left the sherds in increasing numbers in the upper 2 feet of zone A. If they had developed pottery independently, it would perhaps be expected that a characteristic ware would have resulted. However, as noted in the pottery analysis from this site, all five wares found in Pickwick Basin were found here but with no observable stratification. Can this lack of stratification in pottery types be explained on the basis that this people during the building of the upper two feet of zone A were obtaining pottery from several different sources in an increasing amount?

FOOT LEVEL	10 FOOT CUT		15 FOOT CUT		20 FOOT CUT		TOTAL
	25	26	25	26	25	26	
1	2	0	1		1	5	9
2	0	2	1		1	5	9
3	3	5	1		0	6	15
4	12	6	1		2	4	25
5	3	1	1		0	5	10
6	0	1	2		2	0	5
7	3		0		0	1	4
8	0		3		1	2	6
9	1		2				3
10	1		1				2
							88

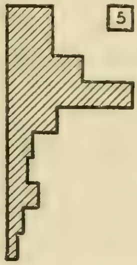
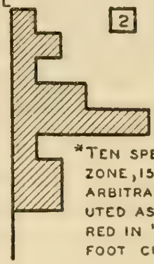


FIGURE 64.—Distribution of flint types 25 and 26, site Lu° 67.

However, it was clear that the transition from a nonpottery to a pottery complex was abrupt and definite at the boundary at about the 2-foot level. Flint types 30 and 34 were definitely below this boundary and types 17, 13, 18, and 27 have a maximum above this boundary, yet types 6, 8, 16, 22, and 44 were abundant in all parts of zone A.

In plate 227, figure 1, are shown types 25 and 26. These appear to be broken ends, points, and bases of crude blades, which were but little specialized from the quarry product. Figure 64 shows the distribution of 88 of these specimens. It would seem safe to conclude that these types were associated with zone A and had but few occurrences below that zone. It also appeared that they were less numerous within the pottery zone than in the 3- to 5-foot levels, i. e., their chief use appeared late in the prepottery period of the mound. In the case of many of the types of flint points at this site, the occurrence was so infrequent that precise conclusions were difficult to reach.

FOOT LEVEL	10 FOOT CUT	*15 FOOT CUT	20 FOOT CUT	TOTAL
1	1	1	0	2
2	2	2	0	4
3	1	1	0	2
4	2	2	2	6
5	4	4	3	11
6	1	0	1	2
7	0	4	0	4
8	2	2	0	4
9	0	0	0	0
10	0	0	0	0
				35



*TEN SPECIMENS IN "A" ZONE, 15 FOOT CUT, ARBITRARILY DISTRIBUTED AS TEN OCCURRED IN "A" ZONE, 10 FOOT CUT.

Figure 65.—Distribution of flint type 17, site Luº 67.

However, the occurrence of the 35 specimens of type 17, as shown in figure 65, would seem to indicate that this form belonged definitely to zone A, and that its maximum occurrence was clearly near the bottom of this zone and below the pottery layer. (See also tables 22, 23, and 24.)

Type 1, as seen in plate 226, figure 2, was a stemless blade with parallel sides, one end pointed, and one end square. This was a simple type—but little specialized and often quite crude in appearance. Figure 66 shows the distribution of 44 specimens of this type. It would seem that this type began to be used in quantity in zone D, reached a maximum in zone C, and was practically discontinued after zone B. (See also tables 22, 23, and 24.)

FOOT LEVEL	10 FOOT CUT	15 FOOT CUT	20 FOOT CUT	TOTAL
1	1	0	1	2
2	0	0	1	1
3	1	1	0	2
4	1	1	0	2
5	1	1	0	2
6	4	1	4	9
7	4	2	5	11
8	0	5	3	8
9	1	2	1	4
10	2	1	0	3
				44

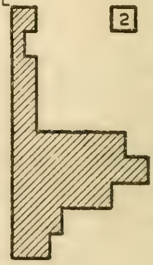


Figure 66.—Distribution of flint type 1, site Luº 67.

The slight occurrence throughout zone A might be easily accounted for on the basis of natural disturbance by the occupants. The type is clearly to be regarded as having its origin and associations below the A zone.

OTHER STONE ARTIFACTS

Stone artifacts other than flint were confined to pestles, hammerstones, broken expanded bar gorgets sometimes redrilled as pendants, and the so-called banner stone or net spaces usually broken longitudinally as shown in plate 220, figure 1. Also, there were jasper beads as shown in plate 220, figure 2.

Pestles were not numerous: The whole excavation yielded only five; three were from the 6-foot level, the other two having come from debris—the result of a landslide.

Six broken banner stones were found in the 3- to 5-foot levels. One was associated with burial No. 81 at the 6-foot level, which carried many other interesting associations. One of the most interesting stone artifacts at this site was the long cyclindrical bead of red "jasper." These beads were carefully drilled, highly polished, and strung 1 or 2 in a necklace with similarly shaped long cylinders of shell. These cylindrical beads varied in length from ⅝ to 2¼ inches and were very close to ¼ inch in diameter. A few were larger in diameter—about ½ inch—and 1 bead was more than an inch in diameter. These large diameter beads were relatively shorter, about ½ to ¾ inch in length, and a few have been ground down at the ends to produce a barrel shape. They were always found with burials—8 burials yielded 26 large jasper beads. In every case save 1 these beads were accompanied by shell beads—generally of the long cylinder type shown in plate 222, figure 1. It was interesting to note that the depth distribution of the burials containing these beads all fell within the 4- to 6-foot levels as follows:

TABLE 25.—*Depth distribution of burials containing beads*

Burial No.	Depth	Shell beads		Jasper beads
		Disk	Cylinder	
	Feet			
10	4.1	----------	×	×
17	4	×	×	×
24	6	----------	×	×
29	6	----------	×	×
32	4.3	×	----------	×
38a	6	×	----------	×
60	5.2	----------	×	×
78	5.4	----------	----------	×

It is to be noted that two of these eight burials, Nos. 17 and 38a, represent cremation. Other deposits of cremated remains occurred in this mound, all within these levels.

SHELL AND BONE ARTIFACTS

Plate 223, figure 2, shows a variety of cylindrical and disk-shaped shell beads. The large disks were made from sections of conchs, and the large cylinders were made from the columella of large conchs.

In plate 223, figure 2, are shown a number of long beads nearly cylindrical but with the diameter tapering toward one end. This gave a slightly conical form and permitted the small end of one bead to fit into the hole in the large end of another, as shown in the photograph. These beads were sections of *Dentalium*, a marine gastropod, which produced its toothlike shell (hence its name) as an elongated but slightly curved cone instead of a coiled spiral as do most gastropods. *Dentalium* beads may be identified by their conical shape and by the fine parallel longitudinal lines on their surface as shown in plate 223, figure 2. Forms of small beads are shown in plate 223, figure 1. Beside the small disk beads, the small gastropod—*Anculosa*, sp.—shown in the upper portion of plate 223, figure 1, was much used. Shell pendants of many forms are shown in plate 222, figure 2, and plate 224, figure 1; many of these were made from marine forms. The columella of large conchs was used for large shell pins. In plate 224, figure 1, is shown a group of eight large triangular shell plates, drilled centrally with a large hole. These plates were so carefully made that when the edges of the plates coincide exactly, the hole through every one was exactly in line. This group seemed to have formed some kind of composite object, probably an atlatl weight. A similar group of shell plates was reported by Moore (1916, p. 468, fig. 17), from Indian Knoll.

The type of implement shown in plate 224, figure 2, was believed to be very significant. These hooklike objects were made of cut antler. They were from 3½ to 5 inches long and had been cut off smoothly at the basal end and drilled with a conical reamer. The hole was as large as the antler would permit at the basal end, and came to a point about half way up the shaft. The other end of the antler had been worked into a peculiarly shaped hook made by a knoblike projection cut obliquely to the shaft. The shaft had been cut and ground to a flat surface on one side under the hooklike projection. The hooklike form was accentuated by having a small round protuberance worked out on the lower edge of the knob, immediately adjacent to the flattened side of the shaft. These specimens were so much alike as to definitely suggest a similar use. It is believed these antler hooks were the ends of atlatls, which, when attached to wooden staves made efficient "throwing sticks" for casting projectiles. It is suggested that the projectile shafts may have been made of cane, the hollow end of which, when thrown, would engage the protuberance on the atlatl hook.

All of these atlatls were found below the 3-foot level, and in or above the 6-foot level.

Antler tips were often cut, sharpened, and conically drilled to produce projectile points. Plate 226, figure 1, shows a number of such points. The total number was not great—all were found in the lower half of the mound. Another artifact of importance at this site was a bone point shown in the center of the lower row of plate 226, figure 1. These points were made from the cannon bone of the deer. They were from 2¼ to 4½ inches in length. One end was sharpened to a blunt point; the other end tapered gradually to a rounded end. It is believed that these were points for projectile shafts and were used by simply inserting the slender end into a hollow cane, the blunt sharpened end being the effective point. In two 5-foot cuts 42 bone points were collected.

Their distribution is shown in figure 67. It is quite apparent that these points were most used in the early stages of the mound and became less abundant toward the top. It seems significant that they had a maximum occurrence where the use of flint was least, i. e., in zone E, and almost disappeared above the 5-foot level where flint projectile points were abundant.

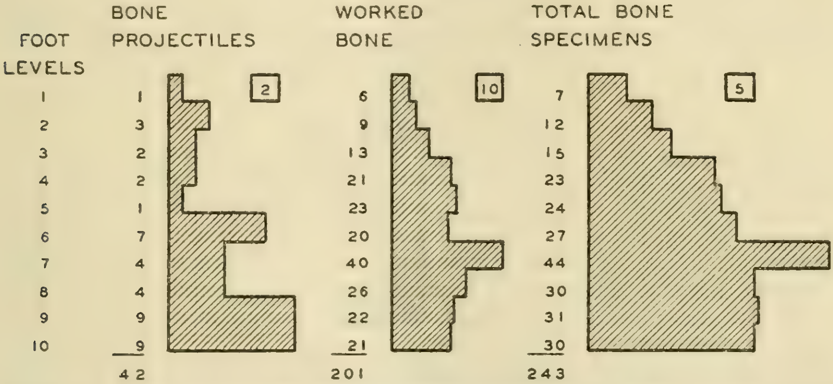


FIGURE 67.—Distribution of bone projectile points, site Lu° 67, and worked bone, collected by 1-foot levels over whole excavation, site Lu° 67.

Plate 221, figure 1, illustrates an interesting development of the fishhook at this site. In the later stages of the mound, within the upper 3 feet, fishhooks were made from the toe bone of the deer. The bone was first split longitudinally, and the solid face ground off, leaving a bone loop of the characteristic cross section. From this near-triangular ring of bone a hook was made by cutting off the proximal end and leaving the distal end to be ground and polished into a hook. In all stages of manufacture hooks were found—many broken in the process. Bone pendants made from the leg bones of turtles were found as burial offerings. All were in the upper portion of the mound.

In plate 221, figure 2, is shown a series of antler tools—blunt drifts, which might have been used in the indirect percussion fracture of flint; also antler chisels, and sections of antler, which were drilled transversely. These horn cylinders are about 4½ inches long, smoothly cut at the ends. Although no care was used to make the cut square, they were polished as if by use. A few were found which had partially decayed, and the horn had lost its surface. The transverse hole was near the center and was about one-half an inch in diameter. Its effect was to produce an object not unlike the head of a hammer. The use of such objects is conjectural. They might have been used to straighten the shaft of projectiles. Some of these were found in the general digging, but three seemed to have been in association with burials (all were from the lowest levels of the mound) two of the burials having been intruded into the undisturbed soil below zone E. The distribution of worked bone and horn may be seen from figure 68, which was compiled from the field specimen record sheets listing a total of 96 field specimens taken from the general digging of this mound. This suggested that the use of bone and horn was considerable in the early stages of mound development, from the bottom to the 8-foot level. From the 7-foot to the 4-foot level the use of bone and horn increased to a maximum. Such use seems to have been abruptly reduced at the 3-foot level and to have increased slightly through the pottery zone. Plate 225 presents the range of forms of awls made from the bones of deer, wild turkey, turtle, etc.

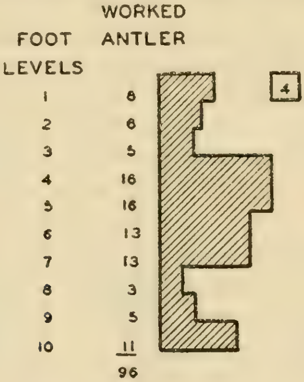


Figure 68.—Distribution of worked antler artifacts as shown by field specimen records from whole excavation, by 1-foot levels, site Lu° 67.

Plate 230, figure 2, shows a drawing restoration of a four-legged grit-tempered pot, a large sherd of which fell in a land slide of a deep profile during the taking of shell samples for a study of conchology after excavation of the site had been concluded. Its original depth is uncertain, therefore, but it is known to have come from near the mound surface and seemingly was not in burial association. The sherd seems to represent a vessel with height of 6.7 inches and diameter of 6.2 inches.

POTTERY

The mound showed pottery to a depth of 3 feet. It was collected by one-half-foot levels in an effort to determine any stratigraphic relations that might exist.

The analysis of the pottery was made on the 20-foot cut. A 5-foot cut 55 feet long was used on the flat top of the mound so that no material from the eroded edge was recorded. A total of 991 sherds served for this analysis. Examination of the other cuts showed similar percentage yields. In the cut, examined pottery occurred to a depth of 3 feet, but only seven sherds were found below the 2-foot level. Thus 99.3 percent of all the pottery was in the upper 2 feet of the mound.

Five types of wares were represented in the pottery. Each ware was distinctive in its temper, paste, and surface decoration. There was no instance where surface decorations were duplicated on the different wares, except for the textile-impressed type of limestone-tempered pottery and shell-tempered vessels, and in this case the textiles were different in weave and texture.

FIBER-TEMPERED POTTERY

Of the total sherds examined, 5.25 percent were fiber-tempered. (See pl. 228, fig. 1.) This was a crude ware, and all the rim sherds and the body sherds found indicated the only types of vessel to be large bowls with flat bottoms or round bottoms. The variety of surface decorations were all haphazard markings or malleations with no attempt to produce a design. The paste was usually black or dark brown and of medium-fine texture. The fiber-tempering material was some fibrous grass; although an occasional elm leaf has been found. The hardness varied from 2 to 2.5.

SAND-TEMPERED POTTERY

More than half the matrix of this pottery was composed of clean quartzitic sand. The texture was medium fine to medium, and the paste was usually black. The hardness varied from 2 to 2.5. This ware showed the most careful execution and technique with the interior and the exterior of the vessels smoothed. There were a great variety of surface decorations.

On site Lu° 67 sand-tempered pottery constituted 3.94 percent of the total sherds. Surface decorations included geometric incised lines (2b), punctate designs within parallel or curved lines (2c), curvilinear incising (2d), and two sherds were type 2g with individual punctations not arranged in any orderly design. This type of punctation was made with a small sharp pointed instrument.

LIMESTONE-TEMPERED POTTERY

The aplastic in this ware was a finely crushed crystalline limestone. The paste was usually black or gray and of a medium-fine to medium texture. The hardness was usually 2 but sometimes as great as 2.5. When examined, rim sherds were found to be of straight-walled vessels or jars with slightly constricted mouth.

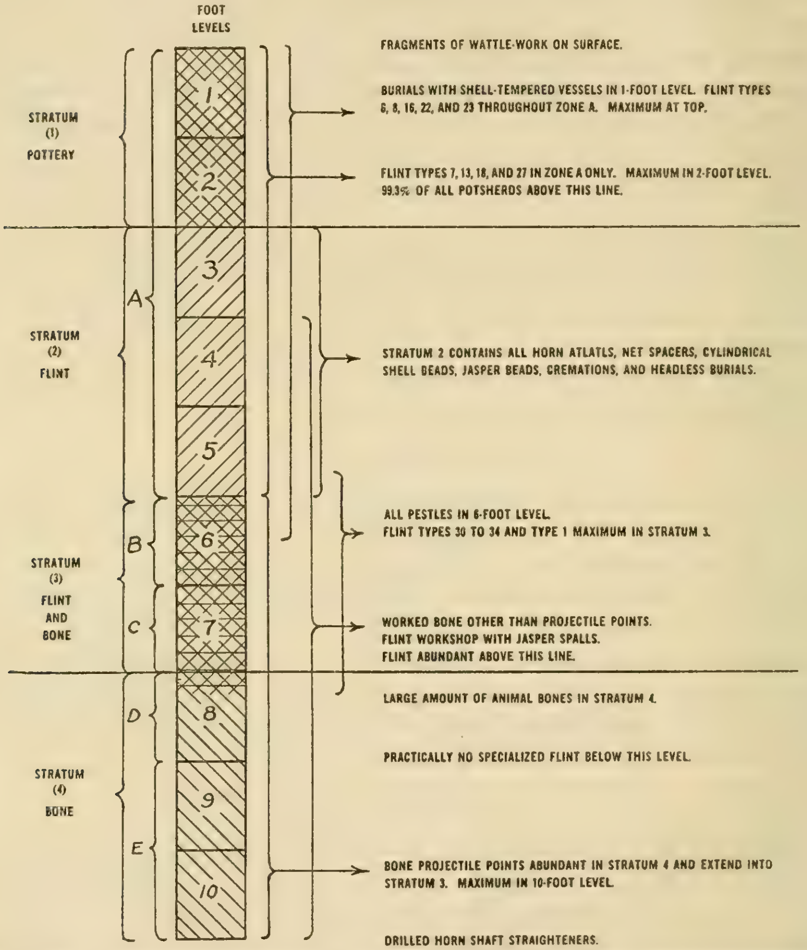

FOOT LEVELS
1
2
3
4
5
6
7
8
9
10
A
B
C
D
E
STRATUM (1) POTTERY
STRATUM (2) FLINT
STRATUM (3) FLINT AND BONE
STRATUM (4) BONE
FRAGMENTS OF WATTLE-WORK ON SURFACE.
BURIALS WITH SHELL-TEMPERED VESSELS IN 1-FOOT LEVEL. FLINT TYPES 6, 8, 16, 22, AND 23 THROUGHOUT ZONE A. MAXIMUM AT TOP.
FLINT TYPES 7, 13, 18, AND 27 IN ZONE A ONLY. MAXIMUM IN 2-FOOT LEVEL. 99.3% OF ALL POTSHERDS ABOVE THIS LINE.
STRATUM 2 CONTAINS ALL HORN ATLATLS, NET SPACERS, CYLINDRICAL SHELL BEADS, JASPER BEADS, CREMATIONS, AND HEADLESS BURIALS.
ALL PESTLES IN 6-FOOT LEVEL.
FLINT TYPES 30 TO 34 AND TYPE 1 MAXIMUM IN STRATUM 3.
WORKED BONE OTHER THAN PROJECTILE POINTS.
FLINT WORKSHOP WITH JASPER SPALLS.
FLINT ABUNDANT ABOVE THIS LINE.
LARGE AMOUNT OF ANIMAL BONES IN STRATUM 4.
PRACTICALLY NO SPECIALIZED FLINT BELOW THIS LEVEL.
BONE PROJECTILE POINTS ABUNDANT IN STRATUM 4 AND EXTEND INTO STRATUM 3. MAXIMUM IN 10-FOOT LEVEL.
DRILLED HORN SHAFT STRAIGHTENERS.

FIGURE 69.—Generalized profile, site Lu° 67, representing an "average" of all available data.

Limestone-tempered sherds were the most common ware on this site; a total of 459 sherds from the cut constitutes 46.3 percent of the total. Surface treatment included plain (3a), textile impressed (3b), rectangular stamp (3c), rhomboidal stamp (3d), parallel-line stamp (3e), and complicated curvilinear stamp (3f). The textile-impressed sherds constitute 49 percent of all the limestone sherds. There were only two sherds bearing the parallel-line stamp (3e), and three with the curvilinear complicated stamp. The latter subtype was quite common on other sites. Limestone-tempered sherds are illustrated in plate 228, figure 2.

CLAY-GRIT-TEMPERED POTTERY

This ware was tempered with particles of clay or crushed potsherds included with either crushed limestone, chert fragments, or an occasional bit of crushed quartzite. The degree of mixing varied widely, and the paste often nearly absorbed the clay pellets into that matrix. The color of the paste was dominantly buff, but gray and black sherds were seen. The texture usually was fine. Hardness was 2 to 2.5. Rim sherds were of straight-sided bowls or jars with constricted mouths. Surface decorations included plain (4a), cord wrapped paddle (4b), and punctate (4c). One sherd of this last subtype was found. The greater percentage (68 percent) of the remainder was cord-wrapped paddled. Some of these 4b sherds showed smoothing after malleation with the cord-wrapped paddle. Type decorations are shown in plate 229, figure 1.

SHELL-TEMPERED POTTERY

Two varieties of shell-tempered sherds were found. One was a thin-walled vessel, undecorated on the body, but with small strap handles and a wide (½-inch) horizontal lip. Oval and small round bowls of this type have been found. The other form was as much as ⅜ of an inch thick, plain or textile marked, and seemed to be of large jars and shallow vessels that may be salt pans. This latter variety had coarsely crushed shell for the tempering material, whereas, the thin pottery shows finely triturated shell or small platelets as the aplastic. The paste was a light buff or deep red with medium-fine texture. The hardness varies from 1.5 to 2.

One hundred and fifty-six sherds of this ware constituted 15.6 percent of the total sherds from Lu° 67. Of this number 98.7 percent were plain (5a). One sherd each of cord-wrapped paddle (5b) and textile impressed (5c) was represented in the cut statistically examined.

Since most of the pottery from Lu° 67 was concentrated in the upper 2 feet of the mound, the statistical analysis of the pottery failed to show any stratigraphic relations of the five wares represented. However, the fact that no cross-over of decorative designs from one ware to another was evidenced seemed to indicate that the different wares were to be assigned to different pottery makers that did not inhabit the site concomitantly, if at all. The shallow depth of the pottery accounted for the mixing of the types, and, hence, their percentage relationship may be taken to indicate the relative length of time each group influenced the site. Nevertheless, it must be taken into account that the peoples responsible for the various wares may not have employed pottery to equal degrees. For example, the fiber-tempered ware certainly was not as advanced as the other forms.

Shell-tempered pottery appeared to have been the last type to have accumulated on this site. Intrusive burials at very shallow depths (less than 1 foot) were sometimes accompanied by bowls and jars of the thin shell-tempered ware.

TABLE 26.—*Pottery distribution by types and depth in site Lu° 67*

Foot level	Pottery types										Total	
	Fiber tempered		Sand tempered		Limestone tempered		Clay-grit tempered		Shell tempered			
	No.	*Per-cent*	*No.*	*Per-cent*	*No.*	*Per-cent*	*No.*	*Per-cent*	*No.*	*Per-cent*	*No.*	*Per-cent*
0.5	12	4.8	7	2.8	111	43.9	72	28.4	51	20.1	253	100
1	23	4.6	15	3.1	213	42.7	157	31.5	90	18.1	498	100
1.5	13	6.1	15	7.1	118	56.4	51	24.1	14	6.3	211	100
2	4	17.4	1	4.4	14	60.8	4	17.4	------	------	23	100
2.5	------	------	1	16.7	3	50.0	2	33.3	------	------	6	100
3	------	------	------	------	3	100.0	------	------	------	------	3	100
Total	52	5.3	39	3.9	459	46.3	286	28.9	155	15.6	991	100

STRATIGRAPHY

From the data on the distribution of artifacts in the natural zones at this site, it was manifest that stratigraphy was definitely established, notwithstanding the many agencies always at work to confuse or obliterate the record. The result of this study of stratigraphy can best be shown by constructing a "generalized profile" upon which may be shown the region of occurrence of various types of artifacts. (See fig. 69.)

Here considerations must be given, first, to the actual occurrence of material as found and as reported herein; second, to the effects of erosion and disturbance by men and animals after the material was laid down. Finally, the method of excavation, which inevitably permitted a few objects to "be found" out of place, must be taken into account. Generalization was made somewhat difficult due to the fact that natural zones did not maintain a uniform width and some disappeared in certain cuts to reappear elsewhere. However, if one accepts the overwhelming weight of evidence of stratigraphy as manifested by the statistical counts of the artifacts found and weighs this evidence in the light of his experience and a careful study of the site in the field as the excavations were being made, it is believed that a generalized ideal profile may be drawn which would very closely represent average conditions over the midden area and even more nearly present the actual order in time of the occurrence of type artifacts at the site. By reference to plate 209, figure 1, one may observe the relative widths of the zones A to E. The boundaries between these zones seemed all equally obvious and important. The study of stratigraphy seems to indicate that the distinction between zones D and E was of little or no cultural significance. Similarly, the separation between zones B and C means very little. However, the other boundaries were important as representing real changes in the culture complex. And further, this study shows that zone A might have been expected to have shown a demarcation between the 2-foot level and the 3-foot level, but no suggestion of such a natural zone line appeared on any profile. The simple conclusion must be reached that sometimes natural zones in shell mounds are quite significant, and sometimes, apparently, zone boundaries mean nothing culturally. Again, it is possible for marked cultural change to occur and leave no suggestion of such change in the profile as an aid to the student of stratigraphy. Such conclusions only emphasize the necessity for utmost care in the collection of material and the study of stratigraphy in the field while excavations are in progress.

GENERALIZED PROFILE

The generalized profile of this site indicates a pottery zone about 2 feet deep containing 99.3 percent of all sherds. The remaining sherds all of which occurred in the next foot were regarded as "out of place" as the result of accident and disturbance. This layer contained a maximum occurrence of flint types 7, 13, 18, and 27. The remaining 8 feet of midden was certainly "prepottery." Within the pottery zone, a few burials occurred—the only burials in the mound to have pottery vessels as burial furniture. These vessels were all shell tempered and seemed to represent the very last occupants of the site.

The "prepottery" midden to a depth of 8 feet may be regarded as separable into three strata. Stratum (2) consisted of the lower 3 feet of zone A. Stratum (3) was made up of zones B and C. Stratum (4) was composed of zones D and E. Stratum (2) was characterized by abundant flint projectile points of the types 6, 8, 16, 22, 44, and 23 which extended into the pottery zone above, but also occurred in the next lower level in only negligible quantity. In this 3-foot stratum was concentrated a large group of associated traits. Here all horn atlatls occur, but nearly all of the flint projectile points were the long slender types definitely suggesting their association. In this stratum occur all the "banner stones" of the parallelepiped form—sometimes called "net spacers." Most of them are broken by being split longitudinally. Such association of "net spacers" and "carved horn hooks" had been previously observed by Moore (1916) at Indian Knoll. In this region many burials occurred some few of which were "headless," and some few were deposits of cremated remains. All headless burials and all cremated remains occurring at this site lay in this stratum or were properly assignable to it. A few burials from this stratum were found slightly intruded into zone B. This stratum was further characterized by a considerable use of shell beads of many forms. In particular, the very long slender shell cylinders all occurred in graves belonging to this stratum, as did all the graves having cylindrical or barrel-shaped, or spherical red stone (jasper) beads. In many cases shell and stone beads occurred together. Stratum (3), which consisted of zones B and C, contained very few inclusive burials. Those that may be regarded as inclusive even then had no artifacts. This stratum was characterized by a maximum use of flint types 30 and 34 and of type 1. Also, bone projectile points occurred in this stratum in considerable numbers—being numerous below it but quite rare above. In this stratum the use of worked bone and horn reached a maximum, and the use of specialized flint seemed to have first become important in the early stages of this stratum. All pestles found, the province of which was known, have come from the upper half of this stratum.

Stratum (4), which was 3 feet thick, contained zones D and E. The lower portion of this stratum was almost sterile of culture-indicative material. Little worked flint occurred in this stratum, especially in the lower 2 feet. It definitely suggests that no specialized flint artifacts were in use when the shell midden began. The types that were found were mostly no more than sharp scrapers, and the very few well-formed pieces—an insignificant portion of the whole—may well be accounted for by accidental intrusion from upper layers. The dominant type of artifact in this stratum was the bone projectile point, which appeared at a maximum in zone E. At the very bottom of this stratum occurred all of the cut antler sectors drilled transversely—perhaps to form projectile shaft straighteners.

This stratum was, therefore, characterized by the use of bone and horn, which must have been common at the very beginning of the accumulation of shell at this site, and in the upper foot level was found the beginning of specializations of flint. This would suggest that in the first 2 feet of this site the use of bone and horn as material for artifacts dominated all else, and that in the 8-foot level the use of flint began to be important. After 3 feet of midden had been deposited, flint artifacts became abundant with the introduction of small flint workshops in the 7-foot level.

In attempting to reconstruct the order of events at this site, one is impressed by the fact of stratigraphy which is certainly demonstrated. The meaning of this stratigraphy, however, is perhaps not so easily interpreted. It is to be noted that in general the lower boundaries of any cultural zone are definite and distinct, but the upper boundaries are usually not so clearly marked. It appeared that customs or traits could be taken on rather abruptly, but that their discontinuance was very gradual. Furthermore, once a custom began or a type artifact appeared, it was likely to persist long after its use had reached a maximum and declined to almost negligible proportions. This was illustrated by the use of bone projectile points from the "bone stratum" extending into the flint stratum. The flint stratum gave rise to types which were certainly "prepottery," but the use of these types continued on into the pottery zone and in one case reached a maximum there.

Such overlapping of traits, shown in the generalized profile, would seem to forbid the attempt to account for stratigraphy on the basis of a shift in population. Since the users of the pottery used exactly the same flint types and approximately in the same proportions as the "prepottery" people, it would seem to be reasonable to suppose they were the same people.

It thus appears to be possible to understand the stratigraphy at this site upon the assumption of the cultural development of a single people. On such an assumption one would think of the shell mounds at their beginning as the midden deposit of a rather primitive river people, living largely upon fish and waterfowl, probably using only wood and bone as material for spears. Later, hunting became important and much bone was mixed with the shell, but only later was flint specialized. Specialization of flint seems to have occurred rather abruptly with the introduction of small flint workshops, after which flint became abundant, but the use of the same bone artifacts continued for some time only in decreasing amounts. The increased use of flint is accompanied by an introduction of a few new burial customs, but the old customs also were continued. The new custom brought in jasper beads—large beads from marine shells, net-spacers, and horn atlatls. These new traits were accompanied by the use of the same flint types in use before these customs appeared. Perhaps the horn atlatls represented only a refinement of similar types of wooden instruments previously in use. Much later pottery came to be used. All five wares are found in a 2-foot level. If a single people learned to make pottery it hardly would be expected that they would make five distinct wares, with no cross-overs of design or temper. It was suggested here that the limestone temper, 46 percent of the whole, was the pottery first made by residents here, and later clay and grit was substituted for limestone to account for an additional 30 percent of the whole. The small amounts of fiber-tempered ware, about 5 percent, and the almost negligible amount of sand-tempered ware, 3 percent, are both clearly importations just like the marine shells.

Finally, after the desertion of this site by this people who while here developed from a cultural level dominated by bone to a level dominated by flint and pottery, there came a group of people who buried their dead in the surface of this mound. These last people used shell-tempered pottery and built structures of wattle work on its surface. This last occupancy was perhaps not long nor very important in the additions to the shell midden made by it.

UNION HOLLOW, SITE LU° 72

This site is a shell mound about 5 miles north of Waterloo on the immediate east bank of the river on the land of Taylor Franks. The mound of shell appeared to cover an area 220 feet E.–W. and about 620 feet N.–S. In the center it rose to an elevation about 5 feet higher than the level of the flood plain. This mound area had been long in cultivation and was, therefore, much eroded. River floods had deposited silt about the periphery to cover a considerable portion of the marginal area. The actual midden, therefore, was much greater in area than appeared on the surface. Actual excavation showed the shell to be 10 feet deep in the single trench which was cut down to undisturbed soil. It is by no means certain that this was the deepest portion of the midden. Time did not permit putting down test pits to locate its exact boundaries. Plate 232, figure 1, shows the site staked at the start of excavation. It was planned to run a trench 10 feet wide entirely through the mound from east to west at least 230 feet long. This was about one-third accomplished when a premature flooding of the area produced the condition shown in plate 235, figure 2. The tent, a small triangular dot in the center of the picture, marked the position of the site which had become an island about a half mile from the new shoreline. The flood waters entered the trench system, as shown in plate 235, figure 1, to a depth of about 10 feet as shown on stadia rod. This flood and consequent "cave-ins" caused a premature but prompt abandonment of the site. The Pickwick Basin was soon thereafter finally filled and the site went completely under the water. From the relatively small sample of material it was possible to obtain here, it is apparent that this site contained a vast store of information and material which it was not possible to recover because of lack of time.

No special features were listed from this site due to the relatively small area excavated.

BURIALS

There were 21 burials removed from the single trench. They were classified as follows:

Round grave, type 1a	1
Partially flexed, type 2a	5
Extended fully, type 3a	6
Sitting posture, type 5	2
Disturbed	6
Infant	1
Total	21

As usual, the extended burials were all near the surface, and it is quite possible that those classed as disturbed were also extended burials, since many of them had been partially destroyed by cultivation. Of these 21 burials, 10 were found to have artifacts and are thus specially listed.

Burial No. 2.—This was an extended, type-3a burial at a depth of 1 foot below the 100–0 stake (pl. 233, fig. 2). In association were one large-mouth water bottle, a small pot with two handles, a perforated strip of shell, a bone plug, and other worked shells. The small pot is shown on the left in plate 238.

Burial No. 3.—This was a partially flexed, type-2a burial at a depth of 1 foot below stake 60–0. This burial was partially disturbed, the skull being crushed and the legs partly missing. In association were found two stone axes, a stone ball, and five flint points standing upright against the sacrum. This burial is shown in plate 234, figure 2.

Burial No. 5.—This burial, at a depth of 2 feet, was so badly disturbed it was impossible to determine its type, but with it were found numerous perforated canine teeth of small carnivores and one large conch shell.

Burial No. 6.—This fully extended burial, shown in plate 233, figure 3, had at its head a small pot and nearby a segment of cut antler. It was at a depth of 1 foot at stake 115–0.

Burial No. 7.—This partially flexed burial, at a depth of 3 feet below stake 70–0, had in association a stone celt.

Burial No. 8.—This partially flexed burial, at a depth of 2 feet at stake 90–0, had at the head a very large sherd of a shell-tempered vessel. This vessel is shown restored by drawing in plate 239, figure 2.

Burial No. 9.—This was a fully extended burial at a depth of 1 foot at stake 130L1. At the head was a badly crushed shell-tempered vessel, as shown in plate 233, figure 1.

Burial No. 11.—This type-2a burial was at a depth of 1.5 feet below stake 70R1. Under the pelvis was found a stone celt.

Burial No. 13.—This fully extended burial at a depth of 1 foot below stake 75R1 had at its head a crushed vessel and a single sherd of a very large vessel. Under the head lay a carapace of turtle about 15 inches in diameter.

Burials Nos. 15, 16, and 17.—These burials, at a depth of 1.5 feet below stake 100–0, are shown in plate 232, figure 2. The heads of these three skeletons, a child (No. 16), and two adults, had all been removed. There were two adult skulls buried separately between burials Nos. 15 and 17. The skull of No. 16 was not found. There were no artifacts in association.

Burial No. 21.—This was a burial in sitting posture at a depth of 3 feet below stake 95R1. With it were one grooved shale object and two bone fishhooks under the head. It is shown in plate 234, figure 1.

ARTIFACTS

The artifacts from the excavation were typical of other shell mounds. Field specimens were listed to the number of 66 as follows:

Fishhooks	2
Bone projectile points	7
Bone awls	8
Bird sternum gorgets	2
Bone bodkin	1
Cut-bone specimens	14
Drilled animal teeth (1 string)	1
Antler spear points	4
Antler "hammer"	1
Antler drifts	4
Hammerstone	1
Stone celts	4
Stone discoidal	1
Whetstone	1
Two-holed stone gorgets	2
Worked shells	3
Shell ear plugs	2
Pottery vessels	5
Large potsherds	3
Total	66

Some of the bone artifacts mentioned in this list are shown in plate 236, figure 1. The two fishhooks are respectively 0.9 inch and 1.1 inches long. They are made from a splinter of heavy bone; the natural curvature of the bone still remains in them. Next to these in the figure is a cut, curved bone, of "bodkinlike" form. This may be a bone fishhook in the process of manufacture. There are shown the usual antler drifts, and antler spear points, together with some of the characteristic bone projectile points. There are also shown two gorgets made from bird sterna and two shell ear plugs with very short stems. In the lower left corner of plate 236, figure 1, is shown an antler section cut and drilled transversely. This may have been used as a "shaft straightener." This type of artifact is common on shell mounds.

Beside these artifacts, 198 flint projectile points were studied for distribution.

FLINT

Plate 236, figure 2, shows various types of projectile points taken from general digging. The lower row of this figure presents eight matched leaf-shaped blades, all from a single cache. All types of flint projectile points are those common to shell mounds, the dominant types being types 23, 3, 8, 7, and 6.

Plate 237, figure 1, shows the form of heavy stone celts in use, a whetstone made of sandstone, and two, two-holed, stone gorgets—one broken, the other complete. These gorgets, flat and rectanguloid in form, are very approximately 2 by 3 inches. The holes are conical and reamed from only one side.

The stone discoidal shown in plate 237, figure 1, is made of white limestone, and is 1.5 inches in diameter.

POTTERY

From the surface of this site 281 sherds were picked up, which were distributed as to temper as follows:

Temper:	*Number*
Shell	58
Clay-grit	158
Limestone	58
Fiber	7
Total	281

From the trench there were 276 sherds recovered which were distributed as follows:

Temper:	*Number*
Shell	68
Clay-grit	104
Limestone	64
Sand	1
Fiber	39
Total	276

The distribution of different temper types in the surface collection is not significantly different from the type distribution of the sherds from the trench, except that the trench yielded relatively a greater number of fiber sherds, as one would expect, since fiber is the oldest type of pottery in the basin and is regularly found at somewhat greater depths than any other type.

The pottery zone in this site, as in most shell mounds, is relatively shallow. That is, most of the shell accumulation is distinctly prepottery. The depth distribution of these sherds is shown as follows:

Surface collection		281
Foot level 1	213	
Foot level 2	47	
Foot level 3	12	
Foot level 4	3	
Foot level 5	1	
Total by levels		276
Total		557

It must be apparent that those sherds in the 4-foot and 5-foot levels are accidental intrusions. It seems highly probable that the pottery zone is only 3 feet deep in this site; although the shell midden extends to a depth of 11 feet.

Type sherds from the general digging are shown in plate 237, figure 2. The type of ware, as determined by temper, has been indicated on the figure for each sherd shown.

Plate 238 presents two small pots from this site. The vessel on the left was in association with burial No. 2. The vessel on the right was from burial No. 1.

A large-mouth water bottle, found with burial No. 2, was badly broken. It was 7 inches in height with a maximum diameter of about 6.5 inches. The temper was very fine shell, and the surface was the hard black ware so characteristic of Moundville. It was not engraved, however.

Another large sherd, found with burial No. 13, has been restored by drawing. It is shown in plate 239, figure 1. This vessel was shell-tempered, and the surface showed the use of the cord-wrapped paddle. It was 12.8 inches in maximum diameter and 13 inches in height. The mouth diameter was 8.5 inches. The rim was plain, without handles or lugs.

Plate 239, figure 2, presents a drawing restoration of a potsherd found with burial No. 8. The height of this vessel was 4.5 inches, and maximum diameter was 5.5 inches with a mouth diameter of 5 inches.

Koger's Island, Site Lu^{v} 92

This site is a village and cemetery on Koger's Island about 1 mile from its southern end.

Koger's Island is about 2½ miles long and approximately a mile wide lying near the eastern bank of the Tennessee River. In low water the island is separated from the mainland on the east only by a shallow slough which sometimes goes dry and thus the island at such times is united with the mainland. In times of high water the slough fills and spreads over a rich meadow bottom east of the island. Closely paralleling the main river channel there is a central elevated ridge on Koger's Island. This ridge is about a mile long and about 800 feet broad and rises about 12 to 15 feet above the level of the meadowland. The site, Lu^v 92, is located on the eastern side of this ridge, about one-fourth of a mile from its southern end. It is approximately at the center of the NW. quarter of sec. 16, T. 3 S., R. 13 W. The area which appeared to show occupancy was about 520 feet E.–W. and about 220 feet N.–S. The area was marked by very dark soil which contained scattered mussel shells, flint chips, and some potsherds. This area of occupation extended northward and eastward to the edge of the ridge which dropped sharply to the bottom land. A 5-foot trench was cut at right angles to the edge of this ridge. The trench extended up the sloping face of the ridge and was driven westward into the level top of the ridge, as shown in the ground plan of the excavations (fig. 70). Here was revealed an extensive village with a midden deposit of about 2-feet depth, spread very uniformly over the level surface of the ridge. This deposit rested on a clean yellow sand which showed occasional post molds (pl. 245, fig. 1). Many burials were made in this midden deposit; and others were dug into slight depressions in the yellow sand. The excavations here were carried on in the winter of 1937–38 and the island was practically inaccessible to anyone except the working parties who reached it only with considerable difficulty by crossing the meadow bottom land, which was then a swamp covered with from 6 inches to 1 foot of water. This gave a maximum of privacy and freedom from chance visitors and potential meddlers. It was possible thus to excavate this site and leave the skeletons and artifacts in place so that the bones could dry out and harden before removal. The skeletal material exhibited quite varied conditions. Some skeletons showed very good preservation, but others were represented by only broken and decayed fragments. All bones in the black village midden were generally dark in color when exposed. Rains were frequent, and it was observed that when rain fell on an exposed burial, the bones were cleaned and whitened without any apparent damage otherwise. If skeletons lay in grave pits, however, water collected and softened the bones. Because of the practical certainty that there could be no meddling by visitors, it was decided to expose a large area of the village, leaving skeletons in position, exposed to rains, but to cut down the earth about them so that they would stand on pedestals. This gave perfect drainage and allowed the rains to remove much of the black midden earth. The bones were thus cleaned, whitened, and when dry, they were relatively hard.

The exposure of a considerable section of the village made possible such pictures as shown in plate 240, figure 1. Plate 240, figure 2, shows the effect of leaving burials exposed on pedestals for a few days. The excavated area had an extreme length E.–W. of 200 feet and an extreme width N.–S. of 150 feet. The form of the trench and a ground plan of burials and features is shown in figure 70.

There was no consistent ordered arrangement observable on this village. The burials, fire basins, and post molds seemed scattered indiscriminately over the area and to bear no relation to each other. However, the ground plan (fig. 70) shows how the burials were concentrated near the edge of the ridge. It may be observed that of the 102 burials within the excavation, 67 had been buried very close to a N–W., S.–E. line, with the head of grave to the southeast in most cases. Sixteen burials were definitely not so oriented, and 19 were indeterminate. The field on top of this ridge, of which this village site was a part, had long been in cultivation and the plow had disturbed all very superficial burials to a depth of 6 inches. The remaining depth of midden—about 1.5 feet—was too shallow to reveal any stratigraphy. The variation in depth of burials was only at most a few inches, and the color and character of the soil made a determination of level of intrustion quite impossible. The depth of burials varied from 1 foot to 1.5 feet from the surface for those in the midden layer. A few burials lay as much as 6 inches deeper in the yellow sand subsoil.

FEATURES

Beside the burials, which on this site present many new and somewhat unusual aspects for Pickwick Basin, the site was notable in the number of well-formed fire pits—clam bakes, or "barbecue holes," as denominated by Fowke (1928, p. 442). These features all indicated that river pebbles played an important part in the process carried on about these fire basins and that many forms of river shellfish were used extensively as food, although this site is not to be regarded as a shell midden. Fire-cracked rocks are found in great quantity scattered in the village layer, and the many fire basins explain the source of this material. Because of a general similarity in these basins, only a few such features have been selected for description.

Feature No. 2.—This was a typical fire basin, a spherical concave pit about 4 feet in diameter, with center about 1 foot deeper than the rim. It was about 2 feet below the surface and had thus escaped destruction by the plow. The middens immediately above this basin had an unusually large shell content, as if shellfish had been eaten about the fire. This basin is shown half excavated in plate 249, figure 1. On the bottom were scattered broken rocks and many potsherds under the shell-filled earth. Post molds, large and small, in the vicinity showed no pattern and no necessary association.

Feature No. 5.—This was a fire basin about 2.5 feet in diameter, shown partially exposed in plate 249, figure 2. It was about 1 foot below the surface. The basin was nearly filled with broken river pebbles, but there were no potsherds and very little shell.

Feature No. 6.—This fire basin seemed clearly designed as a clambake oven. It was about 5 feet in diameter and the center was about 16 inches deeper than the rim. The rim of the basin was about 14 inches below the village surface and the bottom of the pit extended some 6 inches into the yellow sandy subsoil. The floor of the basin was covered with large river pebbles, closely laid, as shown in the partially excavated pit presented in plate 247, figure 2. The entire pit was filled with a concentrated mass of fairly clean shells, practically all bivalves. As this feature was being excavated, it was observed that at the bottom, lying on the pebbles, there was a very considerable concentration of paired bivalves still in paired relationship, as shown in plate 247, figure 2. This definitely suggests a "clambake." The river pebbles at the bottom of such basins always are imbedded in nearly pure ashes. It would seem that a fire was built upon the paving of river pebbles for the purpose of heating them. When the pebbles were sufficiently hot, the fire probably was removed and the bivalves poured on in quantity. If a skin or matting cover was available with which to quickly cover over the pit, the steam arising from the hot rocks would quickly cook the shellfish sufficiently to make them at once available as food. The finding of many paired bivalves on the bottom of this basin suggests that the last "clambake" was so successful as to have provided more mussels than were necessary, and those remaining were left uneaten.

Feature No. 7.—This was a very large clam-bake pit entirely filled with shells. The pit was about 6 feet in diameter and about 20 inches deep in the center. The bottom of the pit was nearly 2 feet below the surface and extended into the yellow sand below the midden. The river pebbles on the floor of the basin are shown in the partially exposed pit in plate 248, figure 1.

Feature No. 8.—This was a fire basin only 2.5 feet in diameter and about 1 foot deep in the center, floored with a few large river pebbles. It was quite like many others similarly constructed but notable in that most of the shell in the fill, and lying on the pit bottom, were large gastropods. Evidently these gastropods were used in "clambakes" in a similar way to pelecypods.

Feature No. 14.—This was a cache of clean gastropods at a depth of 1.5 feet below village surface. This cache is shown in the profile (pl. 247, fig. 1). There was nothing else in association and nothing to show whether the cache was intentional or accidental. This profile shows the relative frequency of stone rubble showing fire action.

BURIALS

Time permitted the excavation of only a small portion of this site. Burials to the number of 102 were recovered. With 50 burials there was found a total of 258 field specimens consisting of 53 pottery vessels, more or less complete, 69 stone artifacts, and 136 bone and shell artifacts. This would seem to set this site apart from others because of the relative abundance of burial furniture.

The burials may be cassified as follows:

Fully extended, type 3a	34
Partially flexed, type 2a	33
Fully flexed (not round grave)	5
Disturbed	11
Infants	11
Reburial of bones (bundle)	5
Incomplete	3
Total	102

Here the term "incomplete" indicates the burial of only parts of a body, still in anatomical order, as for example, in burial No. 9, where the pelvis and left leg only were found each in order.

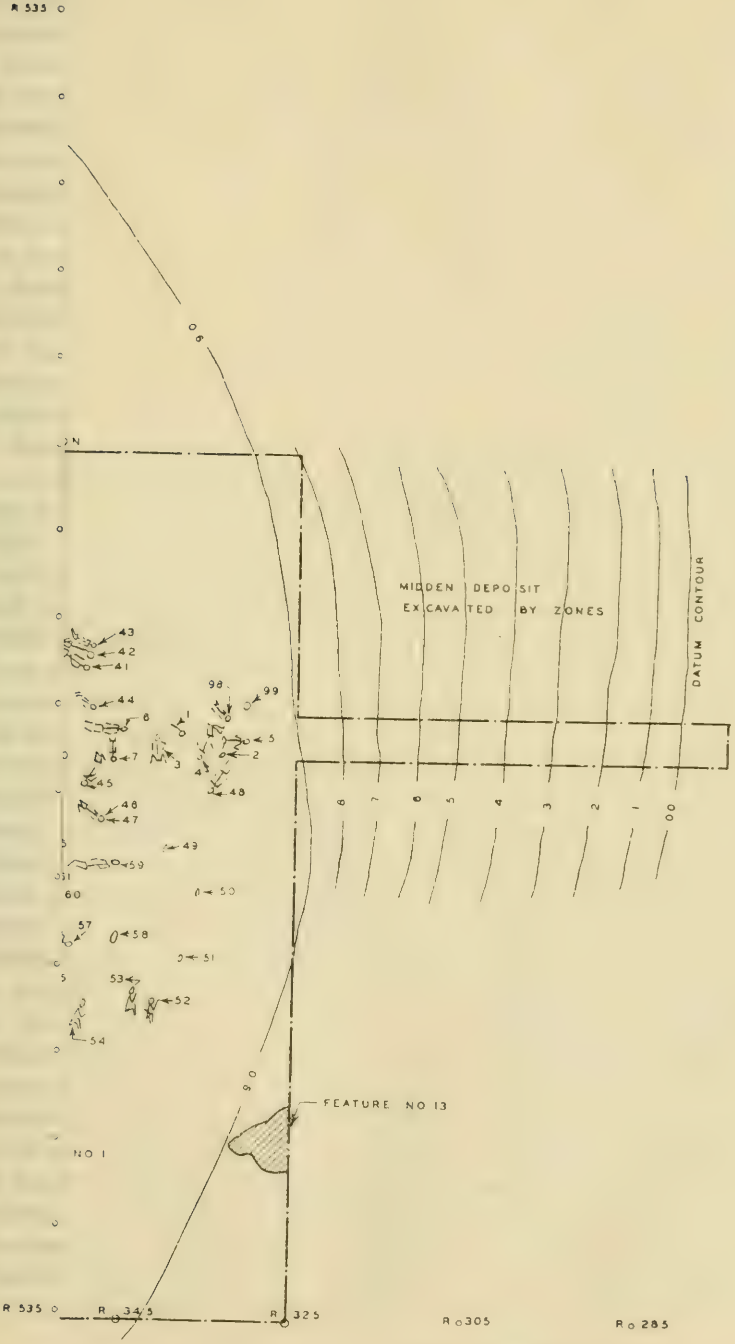
A very interesting feature of these burials was the number of multiple burials which occurred. One third of the total burials were made in multiple. The content of these burials may be tabulated as follows:

Multiple burials	*Total skeletons*
4 graves, 2 burials each	8
1 grave, 3 burials	3
3 graves, 5 burials each	15
1 grave, 8 burials	8
Total burials in 9 graves	34

Of the 102 burials, 6 skeletons were found headless. They were not otherwise disturbed and are believed to have been decapitated before burial. The heads were not found elsewhere. Only those burials are described briefly in detail which had artifacts in association.

Burial No. 1.—This burial of a child at a depth of 2.5 feet was found in very poor condition. Near the head was a shell-tempered pottery vessel with four loop handles. It was 5 inches in diameter and 3.2 inches in depth. Near the chest was a short bone awl and a string of 45 columella shell beads.

Burial No. 2.—This was a reburial of bones not in anatomical order. Some bones were missing. These bones, piled together with the skull by the side of the pile, had accompanying them a shell-tempered globular pot with small mouth. This burial at a depth of 2 feet, was placed on the same level and at the feet of burial No. 5. It may have been associated with it, and the reburial made at the time No. 5 was interred in the flesh. There was, however, no evidence of the walls of any burial pit to indicate the shape of the grave.


R 535
N
MIDDEN DEPOSIT
EXCAVATED BY ZONES
DATUM CONTOUR
90
90
43
42
41
44
8
1
98
99
5
2
3
4
7
45
48
46
47
49
59
60
50
57
58
51
53
52
54
8
7
6
5
4
3
2
1
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FEATURE NO 13
NO 1
R 535
R 345
R 325
R 305
R 285

245407—41 (Face p. 216)

Lu˅92
BURIAL PLAN

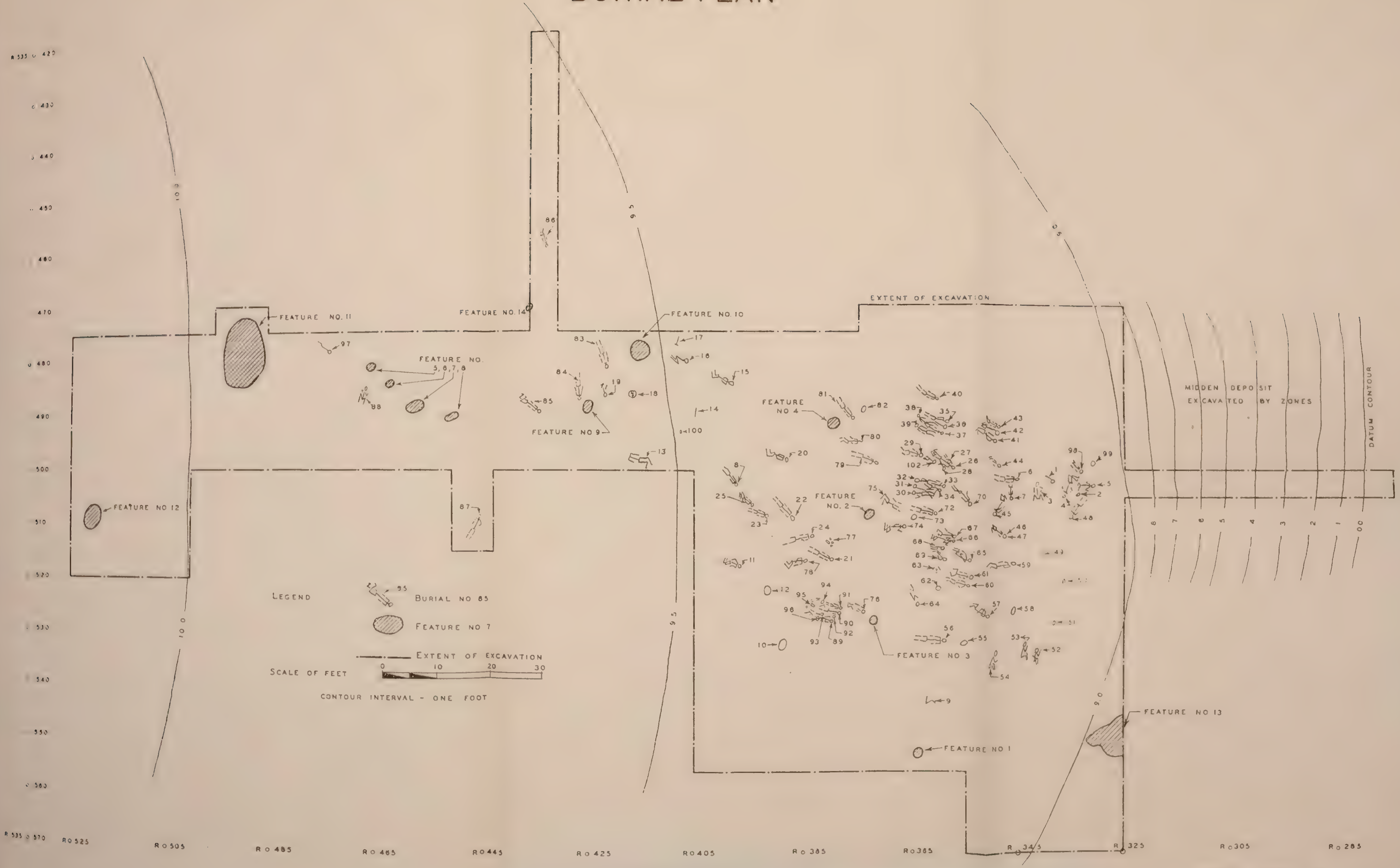

FEATURE NO. 11
FEATURE NO. 14
FEATURE NO. 10
EXTENT OF EXCAVATION
FEATURE NO. 5, 6, 7, 8
FEATURE NO 9
FEATURE NO 4
FEATURE NO. 2
FEATURE NO 3
FEATURE NO 1
FEATURE NO 12
FEATURE NO 13
MIDDEN DEPOSIT EXCAVATED BY ZONES
DATUM CONTOUR
LEGEND
BURIAL NO 85
FEATURE NO 7
EXTENT OF EXCAVATION
SCALE OF FEET
0
10
20
30
CONTOUR INTERVAL - ONE FOOT
10.0
9.5
9.0
R 535 ○ 420
430
440
450
460
470
480
490
500
510
520
530
540
550
560
R 535 ○ 570
R ○ 525
R ○ 505
R ○ 485
R ○ 465
R ○ 445
R ○ 425
R ○ 405
R ○ 385
R ○ 365
R 345
R 325
R ○ 305
R ○ 285

FIGURE 70.

Burial No. 4.—This partially flexed burial at a depth of 2 feet lay in a pit 3.8 by 3.1 feet. It had in association three small pots, all shell-tempered, near its head. One of these pots with two loop handles, had a rather long neck, as shown in plate 262, figure 3, after restoration. Its maximum diameter was 6 inches and over-all height 5 inches. Another vessel, somewhat smaller, with maximum diameter of 4.8 inches and height of 3.2 inches, had also two loop handles and is shown in the upper right of plate 264, figure 3. The third pot was an open pot with flared rim, very thin walls and no handles. Its maximum diameter was 5 inches and height 3.5 inches. A hammerstone lay near the right hand and near the right shoulder there was the carapace of a large turtle.

Burial No. 5.—This was a partly flexed burial of an adult in a body-shaped pit in the loose sand. The skeleton was fairly well preserved. At the head was a water bottle having a maximum diameter of 8 inches and height of 7 inches. The shell-tempering of this plain, undecorated vessel was very coarse.

Burial No. 6.—This fully extended burial at a depth of 2 feet, had about its head three shell-tempered pots and near the left shoulder a disk 4½ inches in diameter and ³⁄₁₀ of an inch thick with notches on the edge. Near the left elbow there were three awls made from the metatarsal of birds. Beside the skull were two wooden disk ear ornaments, well preserved by their copper coatings, which had crumbled into small fragments. These were associated with 25 small shell beads. Near the right knee were 16 triangular flint points, three white chert, three red chert, and the remainder gray chert. These associations are shown in plate 254, figure 1. One of the vessels was a water bottle 5 inches in height and 5.5 inches in maximum diameter. This shell-tempered vessel was covered with a very smooth black surface finish suggesting "graphite," and resembling the "black ware" of Moundville. The black surface had begun to chip off and show the light yellow clay below. This bottle is shown on the right side of plate 262, figure 1. A very interesting vessel with this burial is shown on the right of plate 261, figure 3. This open vessel, 6 inches in maximum diameter and 4.5 inches in height, has two strap handles, at the point of attachment of which the rim of the pot is much elevated. Below the rim, on the exterior surface is a double row of nodes, following parallel to the rim. This shell-tempered vessel is thin-walled and is burned to a deep red color. A water bottle also with this burial was a fine specimen of the hard black-surfaced ware of Moundville. It was 6.2 inches in height, 7.5 inches in maximum diameter with neck 1.5 inches high and mouth 3.5 inches in diameter. It was incised with the usual fine lines, the figure being a serpent. The incising was very faintly done, as if it was only a preliminary tracing to be deepened later. The surface on a portion of the bottle had scaled off so that it was not possible to study the symmetry of the figure. This bottle is shown in plate 263, figure 2. A drawing restoration of this bottle is shown in plate 268, figure 1. A fourth vessel with this burial was a true pot of small size, with height of 4 inches and maximum diameter of 4.5 inches. It had four loop handles, and is shown on the right in plate 264, figure 3.

Burial No. 11.—This partially flexed burial at a depth of 2 feet was in a pit scooped in the loose sand below the midden. Near the head was an open-mouthed, shell-tempered pot with two loop handles and a cut bone pin. This pot was 5.5 inches in height and had a maximum diameter of 6.5 inches. At the right shoulder of this burial there were two highly polished bird metatarsal awls and five bird sterna, cut, ground, and drilled as gorgets.

Burial No. 20.—This partially flexed burial is shown in plate 250, figure 1. Under the chin there was a necklace of 16 perforated animal canine teeth, with a bone needle, copper stained. There was no copper, however, with it. At the right hip there was a perforated stone disk, and at the feet, 2 bird metatarsal awls, one needle-bone awl, 1 deer ulna awl, 12 bird sterna worked into gorgetlike pendants, and three flint points. These associations are shown in plate 254, figure 2.

Burial No. 21.—This was a fully extended burial of an adult, the skeleton of which was in very good condition. This is shown in plate 241, figure 1. It lay in a body-shaped pit in the sand immediately under the midden. At the head was a plain shell-tempered pot with two strap handles. It was 7 inches in diameter and 5 inches deep. The tempering material was very coarse shell, and as a consequence the surface was irregular. At the rim end of each handle were three small nodes as decoration. This pot is shown in plate 264, figure 2.

Burial No. 22.—This fully extended burial at a depth of 2 feet had a well preserved skeleton. At the head were two small pots, one water bottle, and a single large plain sherd, all of shell-tempered pottery. The disposition is shown in plate 242, figure 1. One of these pots was a small duck-effigy vessel with head broken. It was 3.5 inches deep and a bowl diameter of 5.5 inches. The other pot was a thin-walled, open pot with height of 3 inches and diameter of 4 inches. It had two loop handles and two nodes alternately placed. The rim was raised into four points to bear attachment of a node or a handle. The pot is shown after restoration in the upper left of plate 264, figure 3. The water bottle was a small-necked form of light yellow clay. Its diameter was 6 inches. The top of the neck was absent, but what remained gave a height of 6.5 inches. There was with this burial a large, plain, heavy sherd of a utility vessel possibly 12 inches in diameter.

Burial No. 23.—This extended burial was placed in a well-formed pit 6.8 feet long and 3.5 feet wide which extended about 0.8 foot into the yellow sand below the midden. It is shown in plate 242, figure 2, and is notable in the large amount of grave furniture accompanying it. The figure shows its disposition. At the head was a conch-shell cup, ceremonially "killed" by having a large hole drilled through it. On each side of the skull were copper ear disk ornaments with bone pins, stained by copper. Under the chin was a string of 958 shell columella beads and another copper ear ornament. Over the left arm and side were the following artifacts:

One ungrooved greenstone celt;
One dog-effigy pipe;
One greenstone spatulate, ceremonial form;
One beaver incisor;
Two perforated bear teeth;
Eight marine columella shell beads on left hand, lying directly under 14 bird sterna;
Fourteen bird sterna covering left hand. These were cut and drilled as pendants.

On the left side at the foot of the grave and covering the left foot were 10 well-made needle awls, covered by fragments of bird-sternum pendants. The right foot was partially covered with seven bird-sternum pendants and a fragment of weathered hematite. On the right side and covering the right arm were the following:

One ungrooved greenstone celt;
One well finished flint knife, 7 inches long;
Two copper covered wood-disk ear ornaments;
Seven columella shell beads on right hand under 7 bird sterna;
Seven bird sterna covering right hand.

Below the right hand, opposite the right thigh, there was a large marine shell cup, ceremonially "killed," and in it 4 needle awls. Under the shell cup was a stone disk. Between the legs, almost on top of the left femur, were 8 copper pendants and a small copper pin. About the pelvic girdle were 75 shell columella beads and a cube of galena about 1.5 inches on the edge. Many of these artifacts are shown in plates 251 to 253, inclusive. In this grave was a fragmentary pot with one strap handle mounted on an incised collar. A drawing restoration of this vessel is shown in plate 265, figure 1.

Burial No. 24.—This extended burial had the right leg folded at the knee back against the body so that the foot rested at the pelvis. At the head was a shell-tempered pot and two fragmentary vessels, both shell-tempered. This pot had a depth of 5.2 inches and a maximum diameter of 7 inches. It was plain-surfaced with two strap handles. A fragmentary vessel had a height of 4 inches and a maximum diameter of 7 inches. This vessel had a vertical collar about 1 inch high set on a flat, ovaled base, about the periphery of which were six lobes, convex externally. This vessel has been restored by drawing, as shown in plate 265, figure 2. This burial is shown in plate 241, figure 3.

Burial No. 25.—This partially flexed burial was in a pit 5.5 feet long by 3 feet broad. The pit had been intruded into the yellow sand to a depth of 14 inches and had cut through the lower right-hand corner of the grave pit of burial No. 23, as shown in plate 243, figure 1. At the head was a broken shell-tempered pottery vessel, and at the pelvis an unworked deer jaw. This vessel was an open bowl, very plain, and orange in color. It was 6 inches deep and 6 inches in diameter.

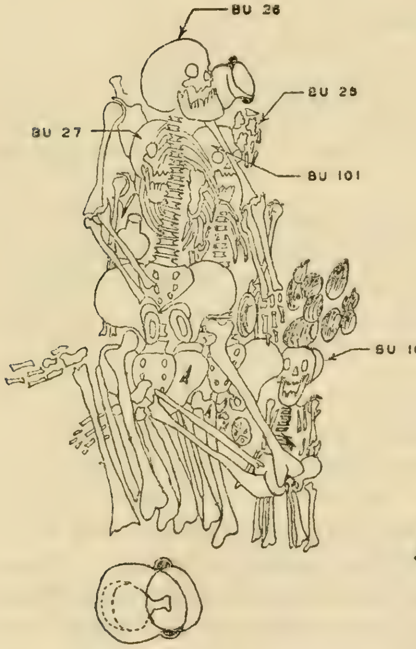


Figure 71.—Site Lu^{v} 92.

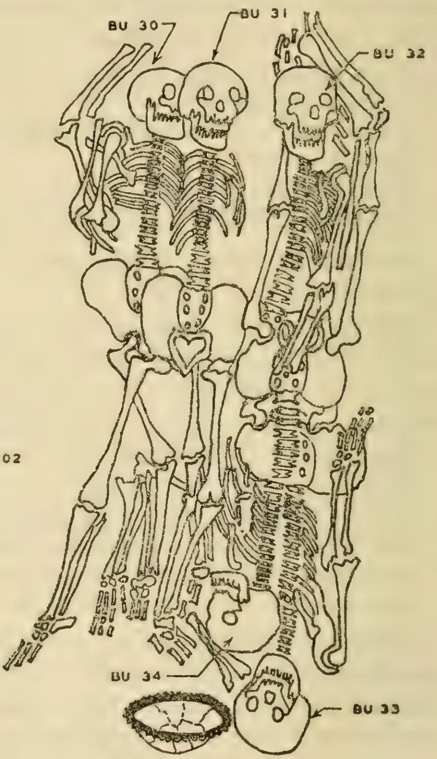


Figure 72.—Site Lu^{v} 92.

Burials Nos. 26, 27, 28, 101, and 102.—This multiple burial contained three adult skeletons, one juvenile, and one infant. All were partially flexed with the knees bent and feet drawn up to the pelvis. Burial No. 26 is almost on top of all the others. (See pl. 243, fig. 2.) A field drawing of these skeletons is reproduced in figure 71. The heads of the burials were all oriented in the same direction. At the head was a small pot, and at the feet, a similar but larger pot, inside of which was a small effigy bowl. Another small pot lay on the right side of the grave under burial No. 26. This pot, with diameter of 6.5 inches and height of 6 inches, had two loop handles. The shell temper was so coarse as to make the surface irregular. Several flint projectile points were found among the skeletons, and at the left side of the grave was a pile of unworked paired mussel shells of large size. The large pot at the foot of this grave had a diameter of 7.3 inches and a height of 6 inches. It was shell-tempered and had two loop handles. Inside it was the duck-effigy vessel shown in the upper left corner of plate 263, figure 1. This vessel was 2.1 inches high and had a diameter of 3.5 inches. The pot at the head of the grave was 3.7 inches high and had a diameter of 4.5 inches. It was the usual form with two lug handles and plain surface.

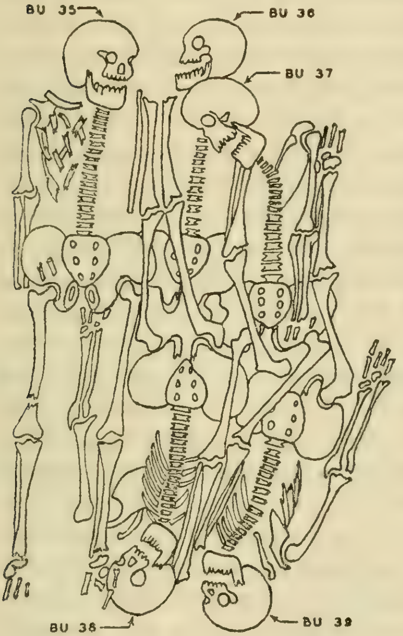


FIGURE 73.—Site Lu^v 92.

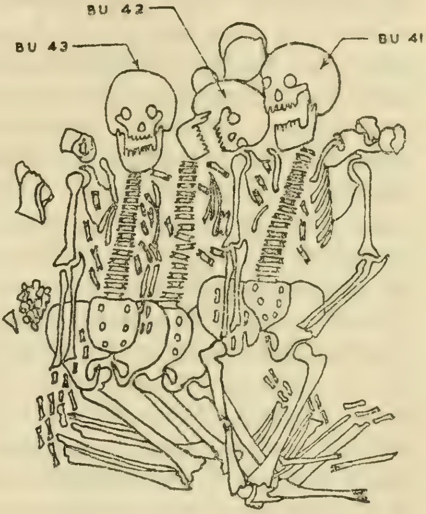


FIGURE 74.—Site Lu^v 92.

Burials Nos. 30, 31, 32, 33, and 34.—This burial of 5 adults in a single large pit had all skeletons fully extended, two beneath, parallel side by side, and on top 3 others with heads in opposite direction. This burial is shown in plate 241, figure 2. At the head of the 2 lower burials, and on a level with them, was a large shell-tempered shallow bowl 14 inches in diameter. It had been crushed by the weight of earth but was easily restored, and found to have a depth of 5.2 inches. The surface of this bowl was plain except that a row of 93 nodes encircled the rim just below the edge. A field drawing of this burial is presented in figure 72.

Burials Nos. 35, 36, 37, 38, and 39.—These were notable only in that all were buried fully extended parallel to each other in a single pit, three with heads in one direction on the bottom and two with heads in the opposite direction, placed on top of the other three. Preservation was comparatively good. There were no artifacts in association. A field drawing is reproduced in figure 73 to show the manner of burial.

Burials Nos. 41, 42, and 43.—This triple burial was in a pit in the loose sand below the lower level of the black midden. The bodies were all parallel, with knees flexed so that heels were against the pelvis. The preservation was very poor due to tree-root penetration. With this burial were five shell-tempered pots distributed near the heads and one marine conch-shell gorget with incised decoration. This burial is shown in plate 244, figure 2, and a field drawing is presented in figure 74. Burial No. 43 showed an evident pathological condition in the lumbar region. This is illustrated by plate 246, figure 2, taken as a close-up before the bones were disturbed. The shell gorget is shown in plate 266, figure 1. The incised decoration has been reproduced in plate 266, figure 2. With this multiple burial was a most ornate pottery vessel. It is shown by drawing restoration in plate 267, figure 1. This pot was, after restoration, 6.5 inches in height and had a maximum diameter of 8.5 inches. It had 4 loop handles, each of which terminated above in 2 nodes projecting above the rim. The shoulder area was decorated by a pair of parallel incised lines hanging in 8 loops fairly symmetrically about the pot. Between these lines about 25 punctations were made for each loop. When found, the pot had been completely crushed. A 2-loop-handled plain pot, with height of 5 inches and diameter of 7 inches, from the burial is shown on the right in plate 261, figure 2. Another pot from this burial is shown in the left of plate 261, figure 3. This pot, 5 inches in diameter and 4 inches high, has 4 areas on the shoulder marked by looped incised lines. Above 2 of these are loop handles and above the other 2 are nodes. The rim is elevated into 4 points to correspond to the decoration. The fourth vessel in this grave was a shallow, open bowl 5 inches in diameter and only 2.2 inches deep. It is light red in color, thin-walled, and its only decoration is a fine milling incised on the edge. It is shown in plate 264, figure 3. The fifth vessel from this grave is shown in the upper right of plate 263, figure 1. It is 3.5 inches in height and 4.8 inches in diameter. It has 2 loop handles with sharp elbows and 2 nodes on each side at the shoulder.

Burial No. 45.—This burial was partially flexed in a pit below the midden layer, as shown in plate 250, figure 2. Near the head on the left was a plain pot with two strap handles. This pot was 6.5 inches in height and had a diameter of 7.2 inches, and is shown on the left in plate 264, figure 1. On the right of this burial were two large sherds of utility vessels, shell-tempered, with strap handles. These vessels had diameters of about 15 inches.

Burial No. 54.—This was a partially flexed burial at a depth of 2 feet. The skeleton was fairly well preserved, but the foot bones were entirely absent. At the pelvis was a plain shell-tempered pot, with diameter of 5 inches and height of 3 inches, and two loop handles; at the feet was the base of another pot, shell-tempered, indicating a pot 4 inches in diameter. This last was fragmentary, seemingly broken by intention, as the large sections had been piled one on the other. Near the left hand was a large flint projectile point.

Burial No. 57.—This was a partially flexed burial of an adult in a shallow pit below the midden, scooped in the loose sand. With this burial were five flint points and a stone discoidal. These artifacts are shown in the right half of plate 256, figure 2.

Burial No. 59.—This was a partially flexed burial placed face downward with skull lying on right side. At the head was a simple, plain pot and a large sherd of a utilitarian vessel. This pot was tempered with very large pieces of shell, so that the surface, which was plain, was very irregular. The height of this vessel was 4.5 inches and its maximum diameter 5.2 inches. It had two loop handles. The large sherd accompanying this burial had a large strap handle on a plain rim and surface. The sherd indicated a vessel, diameter of 16 inches and a height of 12 inches. Near the chin were three columella shell beads and a bone pin, and near the pelvis, a greenstone celt, 5 inches long.

Burials Nos. 60 and 61.—These 2 bodies, both partially flexed, were placed in the same grave, as shown in plate 244, figure 1. Near the pelvis of No. 61 were 2 flint projectile points. No. 60, shown on the right, had a fractured left humerus; near the pelvis were found 20 rounded white quartz pebbles, which seemed to be not native to that locality. These pebbles were entirely unworked, and may represent the decay of fragments of pebble conglomerate.

Burial No. 65.—This was a fully flexed burial lying on its left side in a grave which had been scooped in the yellow sand below the midden. At the head was a shell-tempered pot with plain surface and two loop handles, its maximum diameter 6.2 inches and height 4.2 inches.

Burials Nos. 66 and 67.—This double burial consisted of two partially flexed skeletons, No. 66 on top of No. 67, in the same deep pit dug into the sand below the midden. At the head of the grave was a plain shell-tempered water bottle, and the sherds of a large pot. These sherds were piled together at time of deposit. Other large sherds were piled together at the pelvis. The water bottle is shown on the left in plate 262, figure 1; it had a height of 6.5 inches and a maximum diameter of 6 inches. The large plain sherd indicated a vessel of 12 inches diameter and height approximately 9 inches. These piles of sherds indicate that they are the result of crushing single vessels, and suggest ceremonial "killing." One of these vessels, which was 7 inches in diameter as shown by the basal portion, had, concentric with the base, a concave depression 1.5 inches in diameter and about 0.3 inch deep. This sherd is shown on the right in plate 262, figure 3. Arthritic lipping was shown in the lumbar region of burial No. 66 and pathology of the tibia and fibula is shown in plate 246, figure 1.

Burial No. 70.—This was a fully extended burial, well preserved, but with the feet absent. Near the right shoulder was a shell-tempered strap-handled pot and near the right elbow was a pile of large sherds from the same large vessel. This pot was a plain-surfaced vessel of 5 inches height and maximum diameter of 7 inches. It had two strap handles, each surmounted by two lugs on the rim. It is shown on the left in plate 264, figure 2. The pile of sherds indicates a utility vessel of 14 inches diameter. The vessel was plain except the slightly flaring rim had horizontal double lugs. Only one pair of lugs appeared with the sherds. This burial is shown in plate 242, figure 3.

Burial No. 72.—This extended burial, without artifacts, was placed in a grave at a depth of 2 feet. Parallel to the sides of this pit were dark lines extending from shoulders to knees, on both sides of the pit. This would seem to indicate that the body had been placed in a bark- or wood-lined grave and covered with the same material.

Burial No. 74.—This was a partially flexed burial at a depth of 2.5 feet. It lay immediately under burial No. 73, which was also partially flexed. The lower legs of both skeletons were drawn up so that the heels rested against the pelvis. At the head of burial No. 74 was a broken pottery vessel, shown on the left in plate 261, figure 1. This appears to have been a water bottle with pedestal base. The neck was absent, but the bowl showed incising by many parallel curved lines bent about concave, impressed nodal areas. The body of this bottle was 6.5 inches in diameter. A large sherd of another water bottle showing similar incised decoration, but without pedestal base, was found in the general digging. A drawing restoration of this water bottle is shown in plate 267, figure 2.

Burial No. 78.—This partially flexed skeleton lay in a pit scooped in the yellow sand below the midden layer. It was well preserved. At the head were four pottery vessels sitting in an arc near the skull; all were shell tempered. One was a plain-surfaced pot with two loop handles. Its height was 6.5 inches and diameter 8.5 inches. A second pot with two loop handles was 4.5 inches high and 5.5 inches in diameter. It was also plain-surfaced. A basal portion of a large pot showed that it was about 10 inches in diameter and at least 6.5 inches high, with an incurving rim. With these was a water bottle, shown on the right in plate 261, figure 1. It was of yellow clay, painted red in irregular patches. It was four-lobed, as shown, so that its horizontal midsection would have been nearly square. It was 5.2 inches high and had a maximum diameter of 6.5 inches.

Burial No. 79.—This burial was a fully extended adult in a pit below the midden layer. At the right shoulder was a large water bottle and a large marine conch shell which had been intentionally "killed" by being perforated. This water bottle was 7 inches in height and 7.5 inches in maximum diameter. It was originally finished in the hard black surface so common at Moundville. It had been incised with fine lines. The design was the hand-eye design alternating with the serpent. The surface of this vessel had begun to flake off and the design was thus in part obliterated, but it appears that the hand-eye and serpent head covered one quadrant of the surface. This water bottle is shown in plate 262, figure 2, and a drawing restoration is shown in plate 268, figure 2.

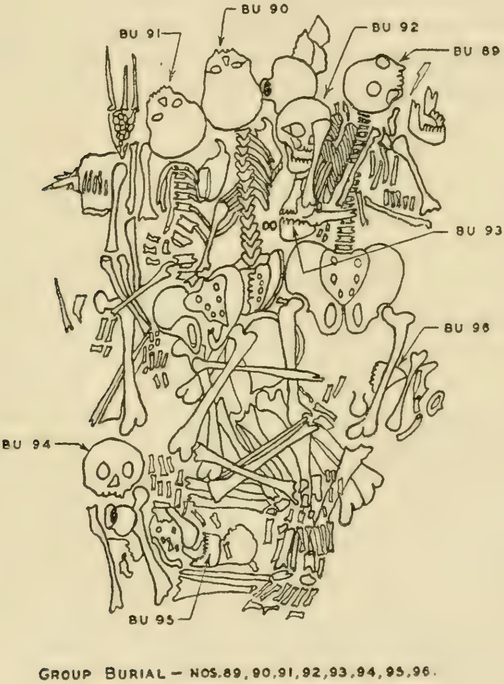


FIGURE 75.—Site Lu^{v} 92.

Burials Nos. 89, 90, 91, 92, 93, 94, 95, and 96.—This burial consisted of five skeletons in anatomical order and piles of bones which appeared to constitute parts of three individuals. These last were evidently bundle burials of bones, and in no case did a bundle burial contain a complete skeleton. The burial is shown in plate 245, figure 2, and a reproduction of the field drawing is shown in figure 75. With this tangled mass of bones were some 50 field specimens, consisting of one water bottle, two bird metatarsal awls, and one curved bone pin. It was not possible to state any definite associate with any particular burial type because of the tangled condition of the skeletons. Some of these associations are shown in plate 255, figure 1. The water bottle found with this burial was 7.2 inches in height and 7 inches in diameter. It was without decoration and is shown on the left in plate 263, figure 2. There was also found a very small mortuary pot with plain surface and two horizontal lugs even with the rim. This vessel had a height of 2.9 inches and a diameter of 3.2 inches.

ARTIFACTS

A summary of the artifacts taken from this site shows a total of 499, listed as follows:

Circular stone disks	3
Hammerstones	9
Celt and fragments, greenstone	19
Discoidal stones	4
Stone gorgets	3
Flint knife	1
Flint points	16
Spatulate form ceremonial ax	1
Bone points	24
Needle awls	91
Tibiotarsal awls	20
Bird-sternum gorgets	27
Bone flakers	5
Splinter bone awls	15
Miscellaneous cut and worked bones	34
Antler tip projectile points	32
Antler tips, worked	22
Antler drifts	6
Cut antler	49
Effigy pipe	1
Pottery vessels nearly complete, described with burials	41
Pottery, miscellaneous large sherds	12
Shell beads, strings	6
Columella beads, large	20
Large conchs	4
Miscellaneous shell artifacts	17
Copper artifacts	14
Wattle work specimens	3
Total	499

About one third of the total number of artifacts were taken from burial association. These represent the best preserved and most ornate specimens from the site. The remaining two-thirds of the total were taken from the general digging and represent mostly the refuse of a village midden.

As pointed out, burial No. 23 was by far the most outstanding in number of burial associations. Plates 251 to 253, inclusive, present some of these associated remains. The large columella beads shown in plate 251, figure 1, are about 1 inch in diameter and were placed on the wrists of the skeleton. The long string of beads shown in the same figure contains 958 beads and is 18.5 feet long. There were other smaller strings in association.

Plate 251, figure 2, presents the two large conch-shell dippers found with the burial. The larger is 12 inches long by 6.5 inches broad and has a hole 2.2 inches in diameter cut in the bowl. The smaller is 9.5 inches long and 4.5 inches broad with a hole 1.2 inches in diameter. There can be but little doubt that the holes in these vessels represent ceremonial "killing" of these dippers.

The spatulate form of the so-called ceremonial ax seems to have been made from greenstone, or amphibole schist. It is 7.8 inches long by 6.3 inches in maximum diameter. It is very highly polished, undamaged, and has a hole made by conical reamer. It has been reamed from both sides. (See pl. 252, fig. 1.)

The disk shown in the same figure is of red sandstone. It is 6.3 inches in diameter and 0.55 inch thick. It is flat and smooth on both sides, with a convex margin in which has been cut 12 crude notches. The hole near the rim, evidently for suspension, is conical, reamed from both sides. The galena ball is 1.2 inches in diameter and is subcubical. The corners of the original crystal have been much abraded.

In plate 252, figure 2, are shown two celts, a flint knife, and a pipe. The greenstone celt on the left is 7.3 inches long by 2.4 inches broad. The one on the right is 7 inches long by 2.8 inches broad. Both are highly polished and undamaged by use. The flint knife, slightly nonsymmetrical, is very finely chipped. It is 8 inches long by 1.9 inches broad. The pipe is made of shell-tempered pottery, light gray in color. It has a maximum height of 3.5 inches and a maximum length of 5.5 inches. The representation is that of a dog of small size. The ceremonial nature of this object is indicated by the use of the "crying eye" design for this dog effigy.

There were 11 artifacts of copper with burial No. 23. These are shown in plate 253, figure 1. Two were copper ear ornaments made by covering circular disks of wood (cedar) with very thin sheet copper. These copper ornaments were embossed in circular form, each outer surface having two concentric circles. The wooden disks were well preserved by the copper salts and appear so truly of circular form as to suggest that they were turned on a lathe. In these wooden disks the outer surface, which was very smooth, was raised into a circular cone which fitted exactly into a similar cone pressed into the copper coating. This raised cone in the embossed copper coating was concentric with the two embossed concentric circles on the outer face. Each of these ornaments was associated with a bone pin about 1 inch long, which appears to have been set into the wooden disk perpendicular to its under face, and perhaps was a pin through the ear for attachment. One of these pins, copper stained, is also shown in plate 253, figure 1.

A total of nine very thin copper pendants, all shown in plate 253, figure 1, were found in association near the pelvis of skeleton No. 23. These pendants are stamped or cut from very thin sheet copper. The edges are cut and smooth, the corners and points sharp and complete. There is no evidence of the use of shears, which would seem to suggest that they were made by being stamped and cut over a die. Seven of these pendants are embossed with a cross, placed symmetrically over the long dimension of the pendant. The over-all dimensions of these pendants are: length, 3.2 inches, and maximum breadth, 1.8 inches. Five of these pendants are nearly exact duplicates of each other, both in the pattern of the edge design and the embossed crosses. These five are shown in the lower row of plate 253, figure 1. Two others, duplicates of each other in form, but differing from the first five, have the same embossed cross. The remaining two, duplicates of a third form, have only the eye design embossed thereon. The exactness of the forms of these duplicates and the embossed patterns would seem to argue that they were cut and embossed, all of each kind, at the same time by the same process. At the upper end of these pendants, in a flared extension of the sheet, is embossed a triangle in the center of which is a small hole, made by punching a sharp needle through the sheet copper. The rim of the hole is rough on one side only, showing the direction from which the tool was thrust. Found with these pendants was a small copper pin which fits this hole and, seemingly, was used to hold them all together. One of the set of five pendants had been broken in two just below the expanded extension at the top by which it was suspended. It was repaired by overlapping the two broken edges and using a small strip of thin copper as a staple-shaped rivet. The ends of the thin sheet of copper were bent down on the reverse side. The effect of this repair was to shorten the pendant by about 0.25 inch and make it a little thicker at the junction.

In general appearance, these nine pendants are quite similar to four lots of copper pendants reported by Moore. Two of these lots, one of seven and one of eight, were found at Thirty Acre Field (Moore, 1900, p. 334), Montgomery County, Ala. One lot of 11 pendants was found on the Charlotte Thompson place (Moore, 1900, p. 327), Montgomery County, Ala. The other lot of 13 pendants was found with a burial in Mound H at Moundville (Moore, 1905). Of this last group, in speaking of burial No. 2, Moore says:

> Near the right elbow were thirteen pendants of sheet copper all similar but no two exactly alike, each in the form of an arrowhead, bearing a repoussé eye. These lay with the bases together, the pointed ends spread in fan shaped fashion as if the bases had been strung together through a perforation in each, and the points had spread somewhat on the arm.

The suggestion that a number of pendants were attached together is quite in accord with the finding at this site. The "repoussé eye" seems to be common to some of the pendants in every group. In the excavation of Mound C (the temple mound) at Etowah, Moorehead (1932, p. 40, fig. 17) found 10 copper pendants made from thin sheet copper, and each embossed with a cross. These were very similar to a group of 14 copper pendants taken from the same mound during the excavation of Thomas (1894) for the Bureau of American Ethnology. These pendants all bear the embossed cross, but are thought by Willoughby (1932, p. 42) to be miniature representation of a ceremonial baton. Many other copper pendants were found by Thomas at Etowah. Some of these are very elaborate representations of dancing warriors. The human figures thus portrayed, which may have been a character in their mythology, carried in the hand a "baton" very similar in form to these small copper pendants. This "baton" had on its face an embossed cross which leads Willoughby, in comparing these copper pendants, to say, "They will be at once recognized as miniature representations of the club-like baton held in the hand of the dancer."

With burial No. 23 were found many bone awls of a form quite typical of this site. Types are presented in plate 253, figure 2. These long awls are made from a very heavy bone, and worked to cylindrical form so that the structure of the original bone is entirely obliterated. These awls are pointed at both ends and are about 6 inches long. With these, a number of bone pins occur. They are about 3.5 inches long, worked into small, well-made cylinders, pointed at one end, and on the other end, beveled into a chisel edge with the cut all on one side. This type of awl was found duplicated scores of times, which suggests some specialized process for which this beveled end was specially adapted. The antler arrow points shown in plate 253, figure 2, were also common to this site. These antler tips, from 1 to 1.5 inches long, are carefully scraped to a sharp point, drilled conically longitudinally at the base, and so cut obliquely at the base as to produce a very effective "barb." This type occurred frequently in burials at this site and was as often used as its companion, the small triangular flint point.

A new type of bone pendant, first found with this burial, and later found elsewhere, seems to indicate a considerable use of the sterna of birds for the manufacture of pendants. Some of these are shown in plate 253, figure 2. The sternum was cut into a general oval at the back, about 1.6 inches by 3 inches. The edges were ground smooth and the dorsal surface of the bone brought to a flat surface. Usually six small holes were drilled at intervals, as shown in the figure. These pendants seem to have been attached so that the keel extended outward. When found, they always occur in numbers from 8 to 12 or more, and never singly. They are always found in groups, at ankles and wrists of skeletons. This suggests some use requiring a number of them to be effective, as in bone rattles. The sternum of birds, while a relatively hard bone, is so thin that it readily decays. Thus, very few of these objects are found complete. They usually are badly broken and disintegrated.

Associations with burial No. 6 are shown in plate 254, figure 1. Sixteen flint projectile points were found varying in length from 1 inch to 1.75 inches. These appeared in two forms, the subtriangular and the triangular points which were characteristic of this site. With this burial were two copper-plated, wooden ear ornaments. With these ear ornaments were some very tiny shell beads, evidently also used about the ears. The bone needles shown in plate 254, figure 1, are the usual form, made from the tibiotarsus of birds.

The most distinctive object with this burial was the stone disk. This was of slate, 4.75 inches in diameter and 0.3 inch thick, with a conical hole for suspension, drilled from both sides. There were 13 notches cut into the edge of this disk, and on its face were incised 2 concentric circles with diameters approximately 4 inches and 4.5 inches. The incising is crude and the face of the disk shows many "slips" of the tool. It seems obvious that in the incising of this disk, no rotation of the disk occurred. The circles are ragged with many sharp bends, and alternate straightened sectors. On the obverse side there is only 1 incised circle corresponding in position to the larger circle on the face. On the obverse side, at the edge of the disk, there are 3 wedge-shaped notches between each of the 13 main notches. These 13 notches extend from 1 face to the other on the disk edge, but these wedge notches appear only on the obverse side. The central area of the obverse face is much hollowed out to make a concavity as deep as half of the thickness of the disk. This concavity appears to have been used as a small mortar, perhaps for grinding paint. Paint has been reported by Moore (1905, p. 145) as found remaining on such stone tablets from Moundville, Ala.

Plate 254, figure 2, presents the burial associations from burial No. 20. With this burial were 17 drilled canine teeth, 2 bird tibiotarsal awls, some 15 bird sterna, of which 3 only are shown, and a bone pin, copper stained. In the lower row, second from the right in this figure, is shown a needle 4.4 inches long. It is cylindrical, pointed, and highly polished. Its density is so great as to at once suggest that it is made of ivory or dentine.

The circular stone disk with this burial was 3.75 inches in diameter and 0.4 inch thick. It was made of sandstone and has crudely incised circles, one on each face symmetrically placed, with diameter of 3 inches. Two notches have been cut on the rim of this disk about 0.5 inch apart. It is drilled conical on both sides for suspension.

In the multiple burials Nos. 60–61, there were 328 columella shell beads about the neck of skeleton No. 60 and 2 flint points 4.5 inches long on the right side of burial No. 61. These are shown in plate 255, figure 2. At each wrist of burial No. 60 was a cache of small pebbles, shown in the figure. These may represent the remains of rattles.

Plate 255, figure 1, presents the burial associations with burial No. 91. These were a flint knife 5 inches long, 2 bird tibiotarsal awls, and a curved bone pin 8.5 inches long. With this burial was 1 triangular arrowpoint and a number of antler projectile points, 30 of which are shown in the figure. These were all cut with a long barb on one side, after the manner common on this site.

Plate 256, figure 2, presents the burial associations of the multiple burials Nos. 89 to 96, which are shown on the left half of the figure. There were three tibiotarsal awls, a flint knife, 5.5 inches long, and a greenstone celt 6 inches long by 2 inches wide. The right half of the figure presents burial associations of burial No. 57.

Miscellaneous stone artifacts from the general digging are shown in plate 257, figure 2. These were two pendants, single drilled—one of slate and one of white limestone—and four fragments of expanded bar gorgets. These were conically reamed from the flat side only. There were four discoidals, the smallest being 1.7 inches in diameter and the largest 2.7 inches in diameter, and a bell-shaped pestle.

Miscellaneous shell artifacts are shown in plate 258, figure 1. The large conch had two holes drilled in the end, indicating ceremonial "killing." It was placed in the grave with burial No. 79. The shell gorget 2.5 inches by 3 inches, drilled with two holes, has a faintly engraved design of a cross crudely cut on the inside surface.

Bone specimens from the general digging are shown in plate 256, figure 1. The awls were from the leg bones of turkey and the loon. The four bone pins and nine bone needles were quite typical of this site. The longest is 6 inches in length and the smallest is 3.5 inches in length. The horn drifts vary in length from 1.8 inches to 3 inches long. There are presented in the figure four true bone projectile points.

Plate 257, figure 1, shows a number of chipped artifacts found on the surface of this village. Except for the small triangular forms and the long bladed, stemmed type, these forms were not found in any burial association. The large object in the figure is made from a block of hematite ore, which is often found in the vicinity in the gravel beds of the Tuscaloosa Formation. In general, while chipped flint fragments were found scattered throughout the village midden, the total number of flint objects was not great, and it was not possible to note any stratigraphy in flint.

POTTERY

This site was notable in that it yielded some 53 more or less complete vessels, all of which were in burial association and all of which were shell tempered. Not one large fragment of any vessel was found other than shell-tempered pottery. The form of these vessels is shown in plates 261 to 264, inclusive, and their burial association is indicated. With each burial description the pottery vessels occurring with it are briefly described. The uniform occurrence of shell-tempered pottery vessels with burials forms a striking contrast to the types of pottery found in the general digging. The counting for temper of 9,000 sherds taken from the general digging showed the following distribution:

Clay-grit temper	8, 240	Sand temper	1
Limestone temper	310	Cell or hole temper	140
Shell temper	267		
Fiber temper	42	Total	9, 000

The midden was so shallow, only about 2 feet deep, it was not possible to discover any stratigraphy. Even where the debris had been pushed over the edge of the ridge to form a talus about 5 feet deep in places, it was not possible to find any significant distribution.

The overwhelming number of clay-grit-tempered sherds seems to force the conclusion that the village was laid down by the makers of this type of pottery. They may have had some use of limestone-tempered ware, but the small amount of the other types of ware, fiber and sand, are surely chance inclusions of no significance. The relatively small amount of shell-tempered sherds found in these excavations may be easily accounted for on the assumption that they belong to the people who buried shell-tempered pottery with their dead. Sample sherds are shown in plate 258, figure 2, to plate 260, inclusive.

CONCLUSIONS

The presence of a great preponderance of clay-grit-tempered sherds in the earth of the village in which only shell-tempered pottery was used with the burials definitely suggests the occupancy of this site by two distinctly different peoples. This suggestion is further strengthened by a study of the artifacts and burials. Clearly, there is a suggestion of an early occupancy by a people having many of the traits of culture of the Shell Mound people, and it is equally obvious that many traits discovered here are quite foreign to the Shell Mound dwellers, but show many affinities with Moundville, Ala.

It is believed that a satisfactory understanding of this site may be had by assuming that the people of the shell mounds came here to eat shellfish, build "clam bakes," and, perhaps, for a brief time to occupy the site for dwelling purposes. These people were in the later stages of development of the shell-mound culture pattern and were using clay-grit-tempered pottery. They also had some limestone-, sand-, and fiber-tempered wares in relatively minor proportions. They dropped bone projectile points, antler drifts, broken 2-holed stone gorgets, and stone pendants on the village, and occasionally they buried their dead in round graves or made partially flexed burials in elongated pits; sometimes they made bundle burials of bones. Generally, they placed very few, if any, artifacts in the grave and never any pottery. The comparatively small shell midden which accumulated here would suggest that this occupancy was not long continued and that the population on the site was never large. This occupancy may be characterized by the following list of traits. This is designated as Koger's Island complex No. 1. Every trait in this list will be recognized as belonging to the shell-mound complex.

KOGER'S ISLAND COMPLEX NO. 1

General traits:
- Fire-burned areas.
- Scattered post molds.
- Stone floored "clam bakes."
- Fire-cracked river pebbles.

Burial traits:
- Fully flexed burials.
- Reburial of bones, bundle.
- Partially flexed burials.
- Burials generally without artifacts.
- Headless burials.

Stone traits:
- Expanded bar gorgets, 2-holes, all drilled from flat face; other side convex.
- Stone or slate pendants.
- Stone discoidals, hammerstones.
- Bell-shaped pestles.

Bone traits:
- Bone projectile points.
- Bone bodkins.
- Antler drifts.

Pottery traits:
- Pottery never used as burial offering.
- Clay-grit temper largely used.
- Limestone-tempered sherds.
- Fiber-tempered sherds.

The burials of this group, being older and made in the shallow earth of the village, were poorly preserved, and were much disturbed by later occupancy. Since, in general, such burials contained no artifacts, they were not listed for special description. It would be expected that artifacts belonging to this first occupancy, when preserved, would be found in the general digging, and not in grave association.

The second and last occupancy of this site was by a people much advanced in cultural development. They possessed much more elaborate stone, bone, and shell implements than the early occupants and used only shell-tempered pottery. This they placed in graves in great quantity. Burials were both single and multiple, extended, or nearly extended, in graves cut into the hardpan below the middens. Since their custom was to use numerous burial offerings, most of the artifacts listed for this group came from burial associations.

The following list of traits which characterize the last occupancy of this site contains many unusual traits found generally at Moundville which are usually accepted as demonstrating definite connections with its people:

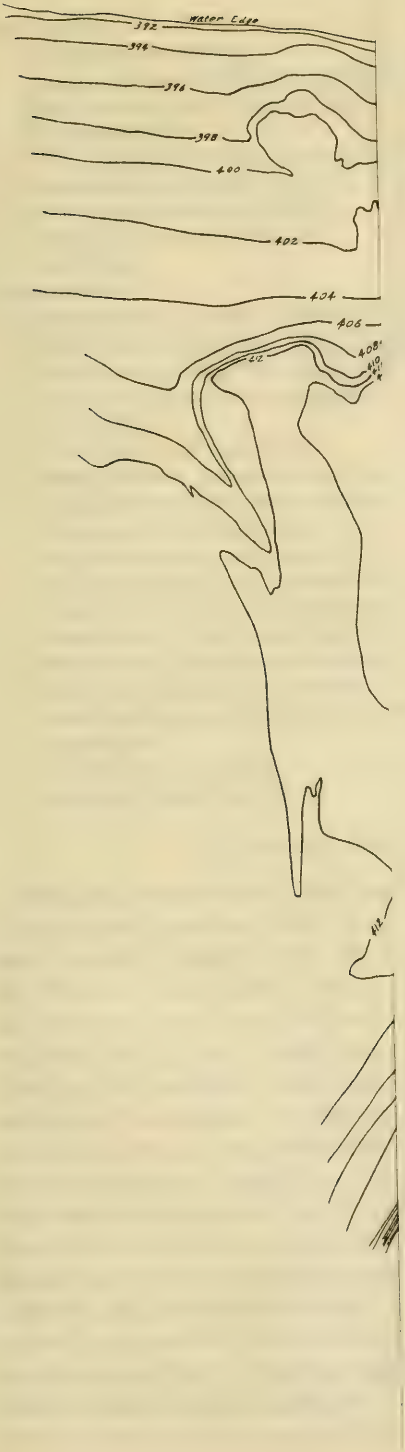
KOGER'S ISLAND COMPLEX NO. 2

General traits:
- Post molds in village floor.
- Fire-burned areas.
- Basin-shaped fire hearths.

Burial traits:
- Single burials, fully extended.
- Single burials, partially flexed.
- Multiple burials, fully extended.
- Multiple burials, partially flexed.
- Burials usually accompanied by artifacts.

Stone traits:
- Greenstone celts.
- Flint knives, 6 inches long or longer.
- Spatulate ceremonial ax.
- Circular stone disk, notched.
- Galena balls.
- Triangular arrow points.
- Long slender-stemmed projectile points.
- Cache of small pebbles in grave.

Bone traits:
- Cylindrical bone needle.
- Tibiotarsus awls of turkey.
- Perforated canine teeth of animals (string).
- Bird-sturnum pendants—"rattles."
- Antler projectile points, conical, barbed.


Water Edge
392
394
396
398
400
402
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412

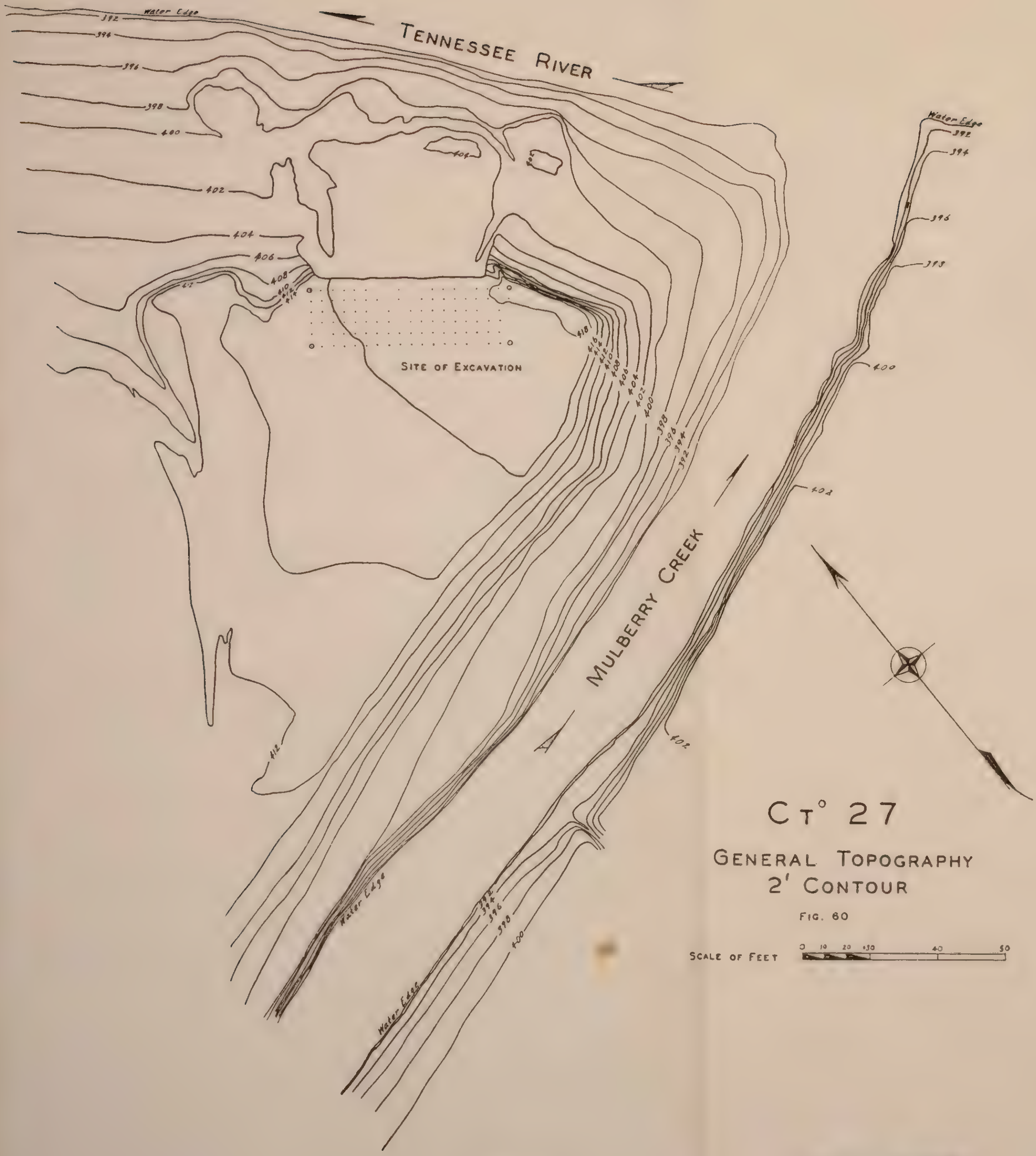

Tennessee River
Mulberry Creek
Water Edge
392
394
396
398
400
402
404
406
408
410
412
414
416
418
Site of Excavation
Ct° 27
General Topography
2' Contour
Fig. 60
Scale of Feet
0 10 20 30 40 50

Figure 76.

Shell traits:
- Marine shells as cups.
- Marine shell gorgets, plain, two holes.
- Shell gorgets, star, cross and square, incised.
- Mussel-shell hoes.
- Columella shell beads, round (small string).
- Columella shell beads, 1 inch or more in diameter.
- Shell cups ceremonially killed.
- *Olivella* shell beads (string).
- Pearl beads

Copper traits:
- Thin copper pendants, duplicate embossed.
- Pendants embossed with cross design.
- Pendants embossed with eye design.
- Circular embossed ear ornaments on wood.

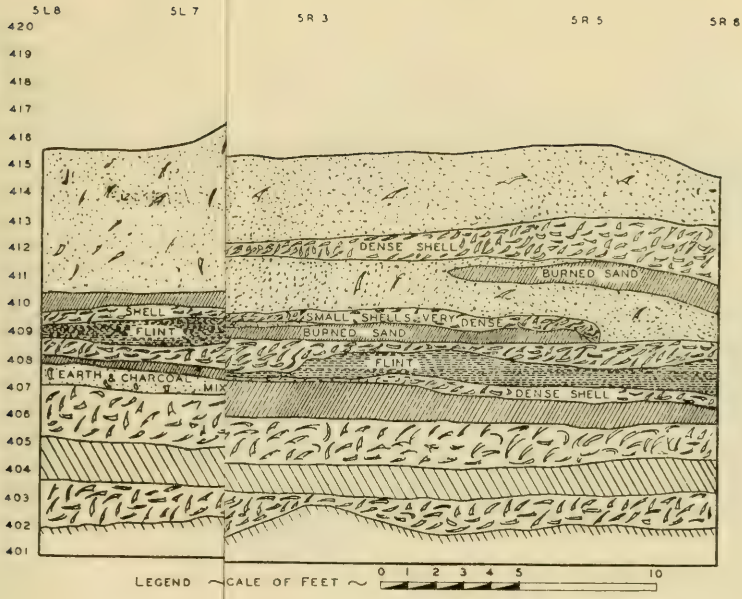
Pottery traits:
- All pottery shell tempered.
- Pottery vessels placed at head and foot of graves.
- Small vessels often used as burial goods.
- Two- and four-strap handles on pot.
- Round handles in pairs on pot.
- Pots with raised rims at handles and rows of bosses following rim or shoulder.
- Water bottle, plain, coarse shell temper.
- Water bottle, black, fine, shell, plain.
- Water bottle, engraved with hand-eye design.
- Water bottle, engraved with flying serpent.
- Water bottle, engraved with fine parallel curved lines about circular depressions.
- Pottery pipe, dog effigy.
- Four-lobed water bottle.

MULBERRY CREEK, SITE Ct° 27

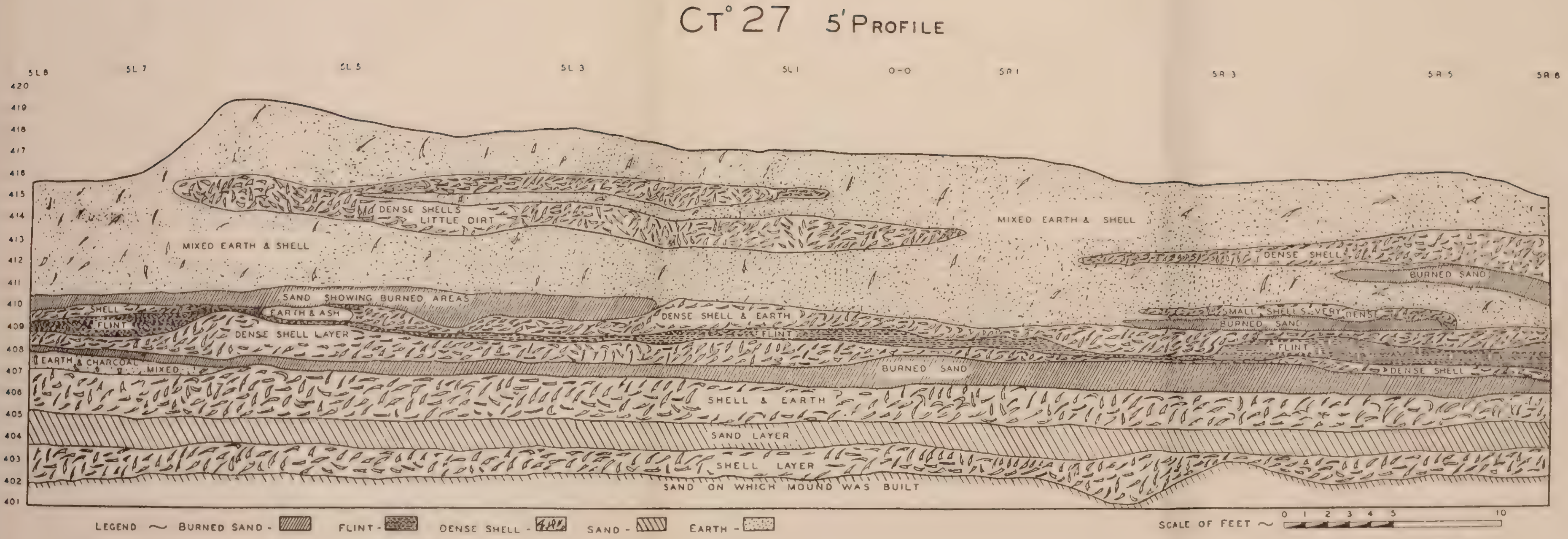
This site was a deep shell mound on the left bank of Mulberry Creek at its junction with the Tennessee River. The site is on the land formerly owned by L. W. Thomason, of Cherokee, Ala., in sec. 22, T. 3 S., R. 13 W. The deposit of shell, about 20 feet deep, extends for more than 300 feet along the Tennessee River, as shown in plate 269, figure 2, and for about 200 feet up Mulberry Creek. The mound had once been the seat of a very substantial building, perhaps a warehouse or trading-post, as revealed by the base of a stone foundation just below the surface. It was admirably situated for that purpose, being above high water, on the immediate bank of the river and opposite the old and abandoned landing at Smithsonia. The river bottom at this point has been much cultivated and the distant edge of the shell area, opposite the water front, merges gradually into the cultivated fields. Probably because it was too dry to be well adapted to other crops, its level surface was given over to the raising of hay. On the top of the mound the timber had been cleared away many years ago. Figure 76 is a topographical map of this site with 2-foot contour intervals. On both, the river (north) side and the creek (east) side, erosion had been long and continuous. However, the creek side had suffered least. The shell had been cut away by flood action until the mound presented, both to the river and to the creek, an almost vertical face of shell about 18 feet higher than the river bottom land at low water, as shown in plate 269, figure 1. On this strip of bottom land a great variety of trees grew, which, with tangled vines and roots, resisted further erosion of the mound in times of high water. In this way the shell mound, although subject to the frequent rise of the river against its face in time of high water, had held its own, and while some erosion occurred at the water's edge, the whole mound was never seriously damaged. Plate 269, figure 1, shows the tangled vegetation of the Mulberry Creek side. Just such timber had to be removed from the river face in order to cut down the 15-foot profile shown in plate 271, figure 1. Figure 77 is a drawing of the 5-foot profile from 5L8 to 5R6, showing the natural zones of shell, sand, and particularly the flint zone at about the 9-foot level.

When the excavation was begun, in the summer of 1936, the timber was cleared from the river side of the mound to permit an advantage to be taken of an almost vertical profile in the disposal of excavated earth. During the autumn the Basin Clearance Section of the Tennessee Valley Authority cleared the whole area, cutting all trees, which stood within the basin, both on the river bank and on Mulberry Creek.

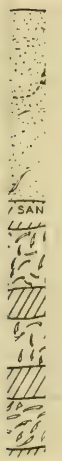
As the excavation of the river face continued, it became apparent that it was highly important to examine a profile parallel to the Mulberry Creek exposure. Thus the north profile was extended to the creek and an east profile cut down along the creek. A drawing of the 10-foot profile which extended from 15L19 to 10R5 is shown in figure 78. Plate 284 shows an end view of this excavation looking west. The mound after the clearance and development of the east profile is shown in plate 270, figure 1. It became apparent, as the result of the work, that the mound had not been laid down wholly by the deposit of shell layers on a level bottom land, but, as shown in plate 299, figure 2, the earliest deposit of shell had been laid down on a sloping sand bar formed in the junction of the creek and the river. On this sloping sand bar due to occupation, shell accumulated to a depth of 2 feet, and later the river deposited several feet of clean yellow sand over this shell layer. Only the lower portion of this shell layer sloping toward the river was covered at that time, the upper end of this shell layer being apparently above the high water, as shown in plate 272, figure 1. Then began a period of the deposit of more shells, which formed a layer of several feet in thickness, being thicker toward the river and fading out in the opposite direction. Apparently the dwellers at that time did not carry their

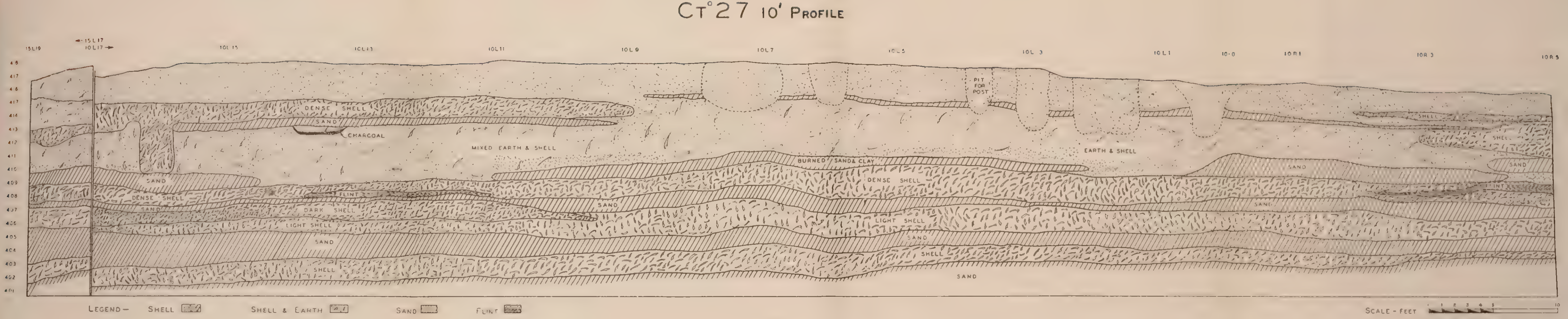

5L8
5L7
5R 3
5R 5
5R 8
420
419
418
417
416
415
414
413
412
411
410
409
408
407
406
405
404
403
402
401
DENSE SHELL
BURNED SAND
SHELL
FLINT
SMALL SHELLS VERY DENSE
BURNED SAND
FLINT
EARTH & CHARCOAL MIX
DENSE SHELL
LEGEND ~CALE OF FEET ~
0 1 2 3 4 5 10

245407—41 (Face 236) No. 1.



LE





CT°27 10' PROFILE

15L19
←15L17
10L17→
10L15
10L13
10L11
10L9
10L7
10L5
10L3
10L1
10-0
10R1
10R3
10R5
418
417
416
415
414
413
412
411
410
409
408
407
406
405
404
403
402
401
DENSE SHELL
SAND
CHARCOAL
MIXED EARTH & SHELL
SAND
DENSE SHELL
FLINT
SAND
DARK SHELL
LIGHT SHELL
SAND
SHELL
PIT FOR POST
BURNED SAND & CLAY
DENSE SHELL
EARTH & SHELL
SAND
LIGHT SHELL
SAND
SHELL
SAND
SHELL
SHELL
SAND
SAND
FLINT
SAND
LEGEND—
SHELL
SHELL & EARTH
SAND
FLINT
SCALE - FEET
1
2
3
4
5
10

FIGURE 78.

245407—41 (Face p. 236) No. 2.

midden building shells very far from the river, as shown in plate 271, figure 2. At a still later time the river once more deposited a layer of clean sand about 20 inches thick over the whole area. The mound was then so high that only a great flood could have covered it. This deposit of sand was laid almost level, which would seem to indicate that the water-borne sand settled from "back water" and that the stream velocity was quite small at this point when this large sand layer was deposited.

Again, after a deposit of nearly 3 feet of shell had accumulated, backwater from a flood again rose to cover the site once more. The deposit of silt was only a few inches thick. It was not wholly of sand, but contained a very fine-textured clay. This deposit is horizontal and seems to have been merely the settling of mud from backwater which had no stream velocity. This seems to have been the last flood to have covered the site, and thereafter the building of shell went on without interruption from the river to form a layer of some 6 feet additional depth. However, after the shell had again accumulated to a depth of a foot or more, earth and clay were carried in by the occupants and spread over portions of this shell layer. This earth seems to have served as the floor of an occupational level, for on it were a number of fire hearths. Above this layer, shell extended to the top of the mound. Figure 79 is a drawing of the east profile along Mulberry Creek, which shows the order of the superposition of the natural zones. Plate 271, figure 1, presents a close-up of the appearance of these natural zones, and plate 270, figure 2, shows how they were continuous from the north (river) side to the east (creek) side of the excavation.

Plate 303, figure 2, shows two views of the site just before it was abandoned. Soon thereafter (February 1938), owing to closing of Pickwick Dam, the Tennessee River again rose to cover the site, this time, not as a temporary flood, but to form a permanent lake. The deposit of silt has again begun owing to the final victory of the river.

After the discovery of the sharply dipping shell layer at the base of the shell mound, plans were made to carefully investigate an undisturbed portion of it, in the belief that its contents would represent the earliest possible occupancy at this site. The trench along the east profile shown in plate 272, figure 2, was, therefore, cut down, and preparation made to follow the low dipping shell as shown in plate 273, figure 1. This stage of the excavation was reached early in January 1937, just at the time the Tennessee River rose to flood stage, as shown in plate 273, figure 2. Because all the trees had been removed from the basin, the new vertical profiles were exposed to the full force of the swiftly moving flood waters. The damage was considerable, and the work at the site had to be abandoned till the water receded. Since there was danger that the flood might be repeated, the crew was transferred to another site more advantageously situated relative to high water. This closed the first period of work at this site. During this period some 20 special features had been recorded and 85 burials had been removed, together with much material recovered from the general digging.

FEATURES

Other than burials in shell mounds, chief interest attaches to the fire hearths. These features definitely reveal how the shell mound was laid down. Clean clay was often brought on to the shell midden and spread in layers several inches thick to cover an irregular area 6 to 10 feet in diameter. It is difficult to tell whether or not this clay was "puddled" but it was spread in thin layers from 3 inches to 6 inches thick, worked to a fairly smooth surface on top, and then fires were built on it. The clay was hardened and usually burned a bright red. These fired areas must surely have been the centers of occupation levels, for all about there are ashes, charcoal, and black earth filled with the bones of deer, bird, fish, and chips of stone and broken flint. Often these fire-hardened layers are superposed one over the other as shown in plate 276, figure 2.

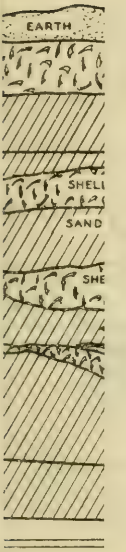
Feature No. 9.—This unusually fine fire hearth was composed of at least four and possibly five layers of clay, superimposed each one on the preceding hearth. Each layer was about 2 inches thick. The entire area was brick red and extremely hard. It was nearly 6 feet in diameter, and dome-shaped, the center being nearly 1 foot higher than the edges.

Of the 23 special features described from this site, 19 were fire hearths, some were flat level floors, and a few were slightly concave. Such hearths are often found damaged by later burials intruded into them.

Feature No. 10.—This was a human skull which had been worked into a bowl. It was found under stake 10L5 at a depth of 8 feet. The skull had been broken into several pieces and the smaller pieces placed inside the larger cup-shaped sections. The whole made a neat little pile as though they had been placed intentionally in that position. (See pl. 278, fig. 1.) The skull cap had been removed just above the ears, the edges had been smoothed down and two holes drilled on opposite sides, just below the rim of the bowl thus formed.

Feature No. 20.—At a depth of 12 feet below stake 30L19 an area about 4 feet in diameter had been paved with flat limestone slabs, as shown in plate 279, figure 2. This area was covered with a 3-inch layer of black ashes. On and between the stones were numerous fragments of burned human bones. In the figure the stones have not all been cleared but the bone fragments may be seen.

It would appear that this stone-paved area is definitely a fire hearth used as a place of cremation.


EARTH
SHEL
SAND
SHE

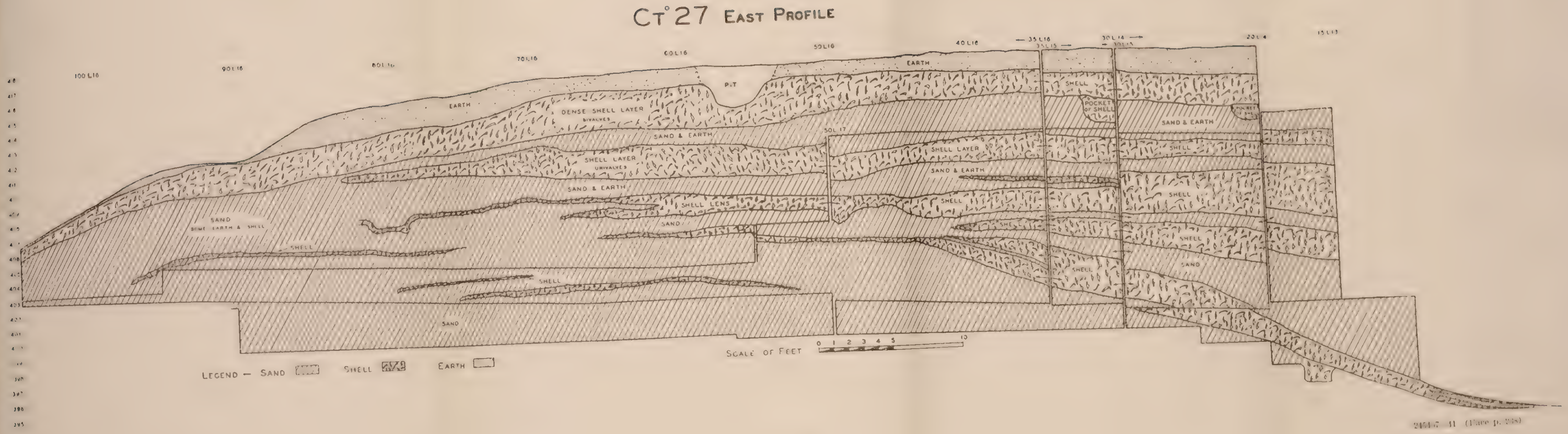

CT°27 EAST PROFILE
100 L16
90 L16
80 L16
70 L16
60 L16
50 L16
40 L16
← 35 L16
35 L15 →
30 L14 →
← 30 L15
20 L4
15 L13
EARTH
PIT
DENSE SHELL LAYER
BIVALVES
SAND & EARTH
50 L17
SHELL LAYER
UNIVALVES
SAND & EARTH
SHELL LENS
SAND
SAND
SOME EARTH & SHELL
SHELL
SHELL
SHELL
POCKET OF SHELL
POCKET OF SHELL
SAND & EARTH
SHELL LAYER
SAND & EARTH
SHELL
SAND
SCALE OF FEET
0 1 2 3 4 5 10
LEGEND — SAND
SHELL
EARTH

Figure 79.

245456—41 (Face p. 358)

Feature No. 23.—Below the low dipping shell layer on the east profile a pit about 36 inches in diameter and 2 feet deep had been cut into the original sand bar on which this midden had been erected. It was possibly a fire pit as a quantity of charcoal was mixed in the fill with a few large stones and much shell. The pit contained a deer ulna and many fragments of deer bones and turtle remains. Charcoal covered the bottom of the pit. The pit is shown unexcavated in plate 301, figure 1, and excavated in plate 301, figure 2.

BURIALS

In the first period of investigation of this site, before the flood in January, 85 burials were found. Like all shell mounds there was a wide variety in the types of burials, many of those previously described as being found at Lu° 67, as well as one additional type. This new type may be described as a burial of the body in a sitting posture. In such burial the body is supported by leaning the back against the wall of a pit, the knees are drawn up, and elevated to the level of the chin, the legs closely flexed. The head probably is held erect by some form of support. Postburial slumping usually produces considerable change in the original position of the skeleton. The head usually falls forward and comes to rest in the pelvic cavity, the legs may spread apart leaving the feet under the shifted skeleton. This is illustrated in plates 280 and 282.

The round-grave pit burial, type 1a, is illustrated in plate 279, figure 1, burial No. 34. Type 1b, body placed on the back, is illustrated in plate 278, figure 2, by burial No. 11.

The partially flexed, type-2 burials are illustrated by burial No. 55 shown in plate 276, figure 1, and by burial No. 85 in plate 281, figure 1. Plate 279, figure 2, presents a cremation in situ, the stone paving of which was described as feature No. 20.

Plate 285, figure 2, presents burial No. 135 showing extreme flexure of legs over body, and a broken and healed left femur.

The extended burial, type 3b, is shown in plate 300, figure 2. These bodies, fully extended to the knees, often had the lower limbs folded back on top of the body and, as shown in the figure, were often headless.

The distribution of the burial types at this site is shown in the following tabulation:

Burial types, site Ct° 27:	*From excavations before flood*	*From excavations after flood*	*Total*
Round grave, type 1a	20	8	28
Round grave, type 1b	8	1	9
Round grave, type 1c	1	0	1
Partially flexed, type 2a	2	3	5
Extended, type 3a	1	1	2
Extended, type 3b	4	4	8
Cremation, type 4a	2	6	8
Cremation, type 4b	1	0	1
Sitting posture type	14	4	18
Disturbed	15	15	30
Infant and children	17	7	24
Total	85	49	134

In general it may be said that it was not customary to deposit artifacts with the dead at burial. Of 134 burials reported as above, 107 had no artifacts of any kind and 9 others had only beads. These were usually the large shell beads, or round stone beads characteristic of the Shell Mound dwellers and were probably ornaments worn by the deceased. That is, the beads represent no special effort to include burial furniture with the dead. Even of the remaining 18 burials which are described in some detail it is not certain that all artifacts found in association with the skeleton were intentionally placed with the dead at burial.

The above tabulation shows that of 134 burials 24 were infant and children and 30 were disturbed by aboriginal occupancy. It is believed that in the case of infants the type of burial was not significant, hence they are not considered in the study of depth distribution. The manner of living on these shell middens accounts for so many disturbed burials (30 out of a total of 134). It appears that burials were often made near fire hearths, perhaps within the floor of the simple dwelling. These dwellings were often moved about on the shell as evidenced by many occupational levels. Much digging in the shell went on at all times. Storage pits, clambakes, fire basins, and graves all required a pit dug in the shell. Burials were never very deep at the time they were made, and, being unmarked in the shell, were soon forgotten and often cut into by the digging of later pits. Of 134 burials there remains, therefore, only 80 in which the original form of disposition of the body could be certainly determined. These have been separated as to type, and listed for the purpose of showing depth distribution of each type (tables 27–31).

TABLE 27.—*Depth distribution of round grave, type 1*

Burial No.	Type No.	Depth	Square	Burial No.	Type No.	Depth	Square
		Feet				*Feet*	
1	1a	7.7	5R3	58	1a	8	15L3
2	1a	8	5L7	64	1b	6.8	15R2
3	1a	8	5L6	69	1b	11	11L7
4	1a	9	5-O	72	1b	11	15L8
5	1a	9	5R4	73	1a	8	15R3
6	1a	10	5R2	74	1a	12.5	15L4
7	1a	9.4	5R3	77	1b	8	20R1
8	1a	9	5R3	80	1a	8.2	20R3
9	1a	10	5R2	82	1a	13	70L18
10	1a	9	5R1	89	1a	13.6	70L16
11	1b	10	5-O	92	1a	12	85L16
12	1b	9.6	5R3	93	1a	12	85L17
19	1a	12	5L3	99	1a	10	35L16
25	1a	6.6	10R4	113	1a	7	45L15
26	1a	7	10R4	116	1a	8.6	45L16
30	1b	8.6	10L4	127	1a	10	50L15
33	1c	7.4	10L4	128	1a	8.5	65L15
36	1b	7.8	10R4	135	1b	9.6	50L15
53	1a	7.3	15L2				
54	1a	7.6	15L2	Total	38		

TABLE 28.—*Depth distribution of partially flexed burials, type 2*

Burial No.	Type No.	Depth	Square	Burial No.	Type No.	Depth	Square
		Feet				*Feet*	
40	2a	1.8	15L3	114	2a	3	70L15
78	2a	2.5	25L18	119	2a	2	25L19
111	2a	1.3	70-O				
				Total	5		

TABLE 29.—*Depth distribution of extended burials, type 3*

Burial No.	Type No.	Depth	Square	Remarks
		Feet		
23	3a	10	5L2	Shell and red-jasper beads.
57	3b	7.6	15R1	Flint points, celt.
83	3b	13.8	65L18	Projectile points, flint.
84	3b	13.8	65L18	Do.
85	3b	13.8	65L18	Flint knives.
86	3b	13.8	65L18	
88	3b	11.2	70L16	Eleven flint points, bone tools, and two dog skeletons.
94	3b	12.8	70L16	
108	3a	2	6013	
136	3b	1.5	25L13	Face down.
Total	10			

TABLE 30.—*Depth distribution of cremations, type 4*

Burial No.	Type No.	Depth	Square	Burial No.	Type No.	Depth	Square
32	4a	8.6	10L4	129	4a	8.5	60L15
46	4a	4.2	10L3	130	4a	8.5	60L15
79	4b	12.5	30L19	131	4a	8.5	60L15
121	4a	8	80L15	134	4a	9	65L16
122	4a	8	80L15				
				Total	9		

TABLE 31.—*Depth distribution of sitting posture burials, type 5*

Burial No.	Type No.	Depth	Square	Remarks
		Feet		
21	5a	9	15L4	
27	5a	9	10L7	
28	5a	4.4	10L10	Projectile points, stone on legs.
34	5a	8	10L9	
35	5a	10.3	10R3	
43	5a	4	15L3	
45	5a	4.4	10L3	
48	5a	4.2	15L3	Shell beads.
49	5a	5	15L9	
51	5a	3.5	15L8	Shell beads, stone ax, turtle carapace.
52	5a	5	15L2	
68	5a	10	15L6	
75	5a	3.9	20R2	
76	5a	4.2	20L1	
87	5a	7.2	35L17	Dog burial 15 inches from feet.
96	5a	3	80L14	Shell beads, bone tools, gorget.
100	5a	3.3	25L14	
137	5a	5.5	35L16	
Total	18			

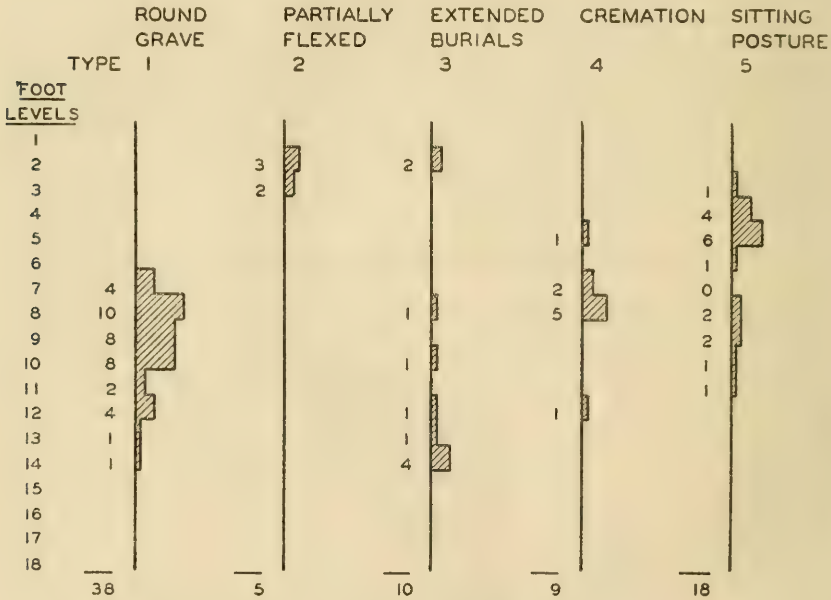


FIGURE 80.—Distribution in depth of five burial types, site Ct° 27.

Figure 80 shows graphically the distribution in depth of each of the five burial types. It appears that the partially flexed type was comparatively rare and quite recent, and definitely associated with the pottery zone. The most numerous type, the round-grave burial, seems to be wholly prepottery as does also the cremated type and the burials in sitting posture. The round-grave type is much the earliest, beginning in the zone of bone artifacts and extending upward to reach a maximum in the 8-foot level, about the time of the beginning of the heavy use of flint and the introduction of the workshop for flint at the site. Cremations seem to have become most numerous just after the shop site was established. The sitting burials, certainly prepottery in time, are found to extend up to the pottery zone, but not into it. No pottery vessel has ever been found in association with a sitting posture burial, and no sherds have ever been found in such pits. It is not uncommon to find the skeleton of a dog buried near burials of this type, as shown in plate 302, figure 2, which presents burial No. 87 with dog burial some 15 inches from its feet. Dog skeletons were often found in the shell midden but it was impossible to say with certainty that they were in all cases associated with any burial. The only other burial type with which dog burials were definitely associated was the type-3b extended burials. In this burial type the skeleton is extended to the knees and the lower legs are folded back on top of the body. Burial No. 88 of this type is shown in plate 300, figure 1, with two dog burials in association.

Burial No. 15.—This burial was found in square 5L8 near the surface, and so near the edge of the mound that a landslide had very considerably disturbed it. The bones were in very poor condition partly as the result of the slide and partly as the result of further disturbance by tree root growth. The original placement of the body was uncertain. A water bottle in fair condition was found near the lower jaw. Several large sherds lay over the burial. At one end of the grave was a water-worn pebble which showed it had been burned.

Burial No. 28.—This burial was found at a depth of 4.4 feet below stake 10L10. The body had been buried in a sitting posture and two large stones had been placed on the leg bones. In the pit were found three flint projectile points.

Burial No. 35.—This was a burial of a child in a sitting posture. In cutting over a prepared burned clay floor in square 5R3 at a depth of 10.3 feet a pit was evident. This pit had been excavated through the clay hearth into the shell beneath, as shown in plate 303, figure 1, and the body of the child definitely placed in a sitting posture. The pit had been filled with shell which permitted some slumping of the body, but still held the skeleton in a seated position. With this burial was a columella shell gorget.

Burial No. 43.—This was a burial of a child in a sitting posture at a depth of 4 feet below square 15L6. A flat limestone slab had been placed in the pit to support the body in an erect position. The slab had fallen forward and rested on the shoulders of the skeleton. Plate 282, figure 1, shows the skeleton after the removal of the slab and the excavation of the surrounding shell. There were many shell beads around the body.

Burial No. 52.—This burial lay in square 15L9 at a depth of 5 feet. It had definitely been placed in a sitting posture, and had slumped forward. In this grave to the left of the body were two stone axes, and under the body a worked antler. Near the left shoulder the carapace of a turtle was found.

Burial No. 54.—This burial was completely flexed on left side in square 15L2 at a depth of 7.5 feet. Near the neck was an elongated curved shell gorget with disk shell beads and over the thighs a pile of crinoid beads. This burial is shown in plate 277.

Burial No. 57.—This burial was extended, of type 3b. It was in square 10–0 at a depth of 7.5 feet. Near the head were found three flint knives, one projectile point, two flint scrapers, and a hammerstone as shown in plate 292, figure 1.

Burial No. 58.—This burial, in square 10R1, was at a depth of 8 feet below the surface. It was a round-grave, type-1a burial. Under the chin was found a flint projectile point and the carapace of a turtle.

Burial No. 73.—This burial was in square 10R3. It was 8.3 feet below the surface. It was a round-grave burial of type 1a. With the burial was a bone awl and a worked antler.

Burial No. 77.—This burial was partially flexed, of type 2a. It lay in square 15R1 with its right shoulder near a clay fire-hearth at a depth of 8 feet. With this burial were two large flint projectile points.

Burials Nos. 80 and 81.—These burials were found in square 15R2 at a depth of 8.2 inches below the surface. These burials are shown in plate 281, figure 2. Burial No. 80 was a round-grave, completely flexed burial with the body on the left side. Across the lower limbs were found two very long carved bone spatulas, seen in the figure, and shown in more detail in plate 287, figure 2. Near the foot of burial No. 80 was a pile of bones in disorder representing all that was left of burial No. 81. Many of the large bones and the skull were missing. It is difficult to tell certainly whether this represents a deposit of disarticulated bones, or represents the remnants of a disturbed burial. It may be the former, since with the bones was a cache of 10 matched flint knives carefully piled on top of a bone awl, as shown in plate 281, figure 2, and, in more detail, in plate 291, figure 1. However, since so many of the bones were absent and since disturbance of burials is so frequent in shell mounds, this burial was classed as a "disturbed" burial, as no certain conclusions could be drawn from it.

Burials Nos. 83, 84, and 85.—This was a triple burial under the east profile in square 65L18 at a depth of 13.8 feet. This unusual burial is shown in the profile in plate 274, figure 1, and a close-up of it is presented in plate 274, figure 2. This burial was in a sand layer, which rested directly on a 6-inch layer of shell. Multiple burials are not usual in shell mounds, and the form of flexure was not common. None was fully flexed. In each case the arms were extended and the legs flexed back on the body. In a circular pit the bodies had been laid one on top of the other so that Nos. 83 and 85 were nearly at right angles to each other with No. 84 between.

Skeleton No. 83, which lay on top, had three flint projectile points between the ribs. These seemed to lie within the thoracic cavity and could have been the cause of death. These points are shown in lower row at left in plate 289, figure 2.

Skeleton No. 84, which was the second from the top, was incomplete. The hands, ulnae, and radii were missing. There were seven projectile points in association with this burial. Four of these points were at various positions in the thoracic cavity, and two were firmly imbedded in the spinal column. Of these two, one had entered the body from the front and had lodged in the centrum; the other had penetrated from the rear, and was imbedded between two neural processes, as shown in plate 275. A close-up of these imbedded points is shown in plate 290, figure 1. The point which had entered from the rear, shown as second from the right, top row of plate 289, figure 2, had so shattered the bone that the bone had disintegrated. The seventh point was found in the mouth cavity.

Skeleton No. 85 was the lowest in the grave. This was a young person, as ossification was not yet complete. With this individual, the first to be placed in the grave, was a cache of artifacts that lay between the left arm and the body at the elbow. It consisted of two bone awls made from the ulna of deer, a flint knife, and two projectile points, shown in the right half of lower row of plate 289, figure 2. This individual also had a projectile point imbedded in the spinal column. The vertebrae is shown with point in situ in plate 290, figure 1. It should be noted here that this type of point was not found elsewhere in this mound.

Burial No. 86.—This burial was found in square 65L18 at a depth of 13.8 feet below the surface. This was a partially flexed burial, but it had been disturbed and most of the leg bones were missing. The body had been laid face downward, but twisted at the waist, so that while the head and the chest were face downward, the pelvis and legs were face up. Near the left elbow of this skeleton was found a stone cylinder.

In May 1937 work was resumed at this site. The problem was to clear away the debris caused by the flood and cut down new profiles using the same system of staking so that the study might be resumed. In particular, it was desired to reestablish the east profile at the bottom of the mound in order that the low-dipping shell layer might be investigated, since it was certainly the earliest indication of occupancy at this site. The original deep trenches on the east profile were completely filled with mud and silt, and both the north and east walls had caved in so badly that many sections of the mound were worthless for investigation. By cutting back into the uneroded portions and by stepping back profiles in cuts 4 to 6 feet deep, new profiles were exposed. So great was the accumulation of debris, a dragline power shovel was employed to remove the heaviest deposit of talus, and to reestablish the deep trenches, which went down to or below present river level, a depth of some 23 feet. The ground plan of the excavation of this site presented in figure 81 shows the area lost and discarded due to the flood action. Plate 283, shows the new east profiles at the northeast corner of the mound. This profile shows very clearly the manner in which the mound was laid down, and particularly shows the superposition of river-laid sand layers on layers of shell in the early stages of the mound development. Plate 299, figure 1, shows the low-dipping shell layer exposed, and by the presence of the workmen gives an impression of the actual depth of this deposit of alternate layers of shell and sand.

After the resumption of the excavation, an additional 49 burials were uncovered. The distribution as to type is shown on page 240 as an addition to the 85 burials previously considered.

Only those burials which have artifacts or other significant associations are listed for individual description.

Burial 87.—This burial was at a depth of 7.2 feet below 35L17. The skeleton was in a sitting posture, knees elevated. It was without artifacts but a dog skeleton lay within 15 inches of its feet, evidently an intentional association, as shown in plate 302, figure 2.

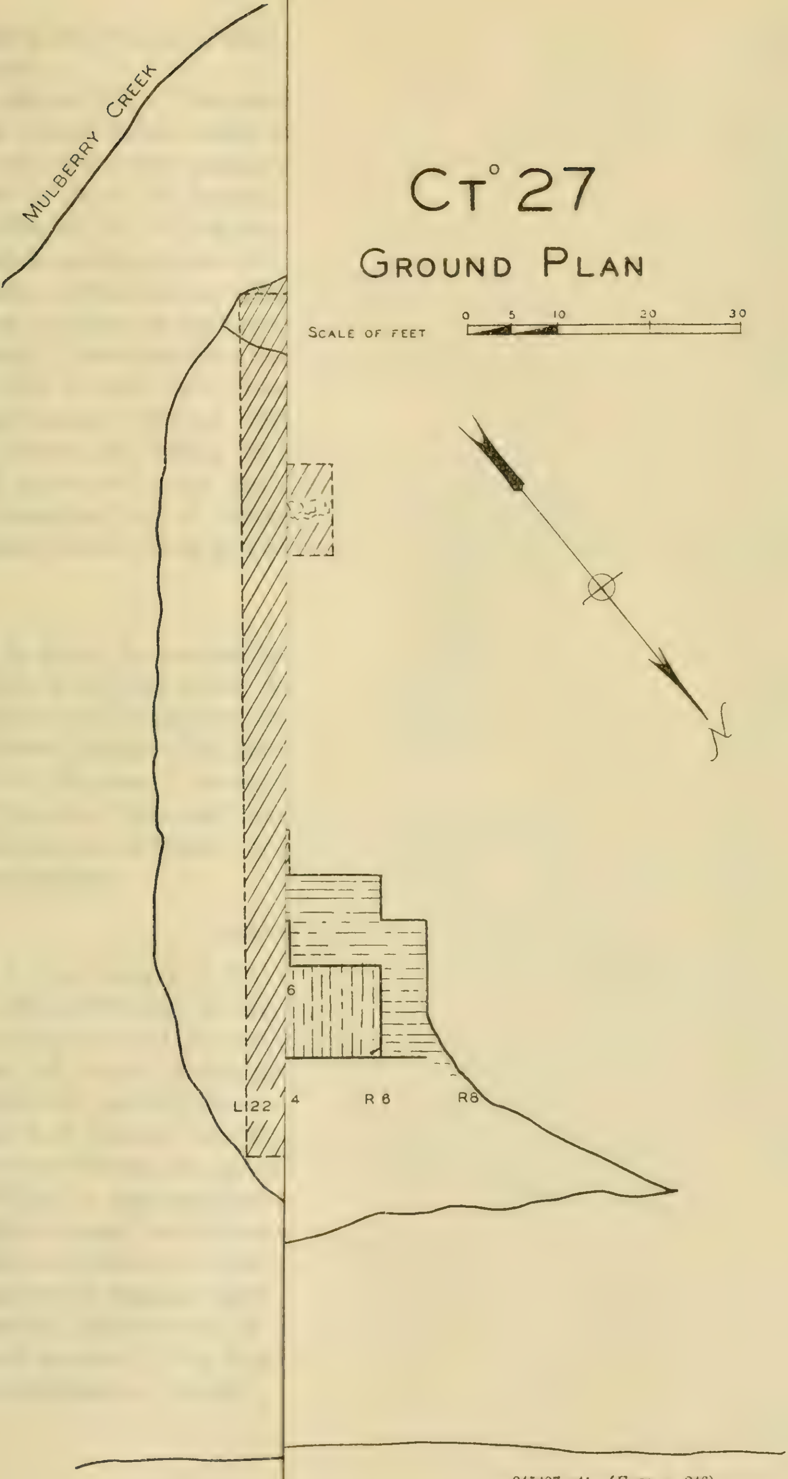
Burial 88.—This was a partially flexed burial at a depth of 11.2 feet below stake 70L16. With it were 10 projectile points—1 flint spear, a bone flaker, an antler chisel, a bone drift, and an incisor of a large rodent, all shown in plate 291, figure 2. The positions of the artifacts in situ are shown in plate 302, figure 1. Two dog burials were at the same level nearby, as shown in plate 300, figure 1.

Burial 91.—This burial at a depth of 6.6 feet below stake 85L16 had suffered postburial disturbance by later mound occupants. Its original disposition could not be determined. Mingled with the scattered bones were numerous drilled canine teeth of small mammals. Many of these teeth were decayed and fragmentary. Thirty-eight of them are shown in the topmost string in plate 289, figure 1.

Burial 93.—This was a partially flexed burial 12 feet below stake 85L17. It had a flint projectile point in the thoracic cavity.

Burial 94.—This was an infant burial partially flexed in the deep sand layer on the east profile, 12.6 feet below stake 70L16. With this burial was a portion of a conch-shell cup.

Burial 100.—This was a flexed burial of a child which was covered with a circular ring of large river pebbles. With this burial was a square shell gorget with five holes, shown in plate 288, figure 2, a


Mulberry Creek
Ct° 27
Ground Plan
Scale of feet
0
5
10
20
30
N
6
L22
4
R6
R8

215407—41 (Face p. 246)

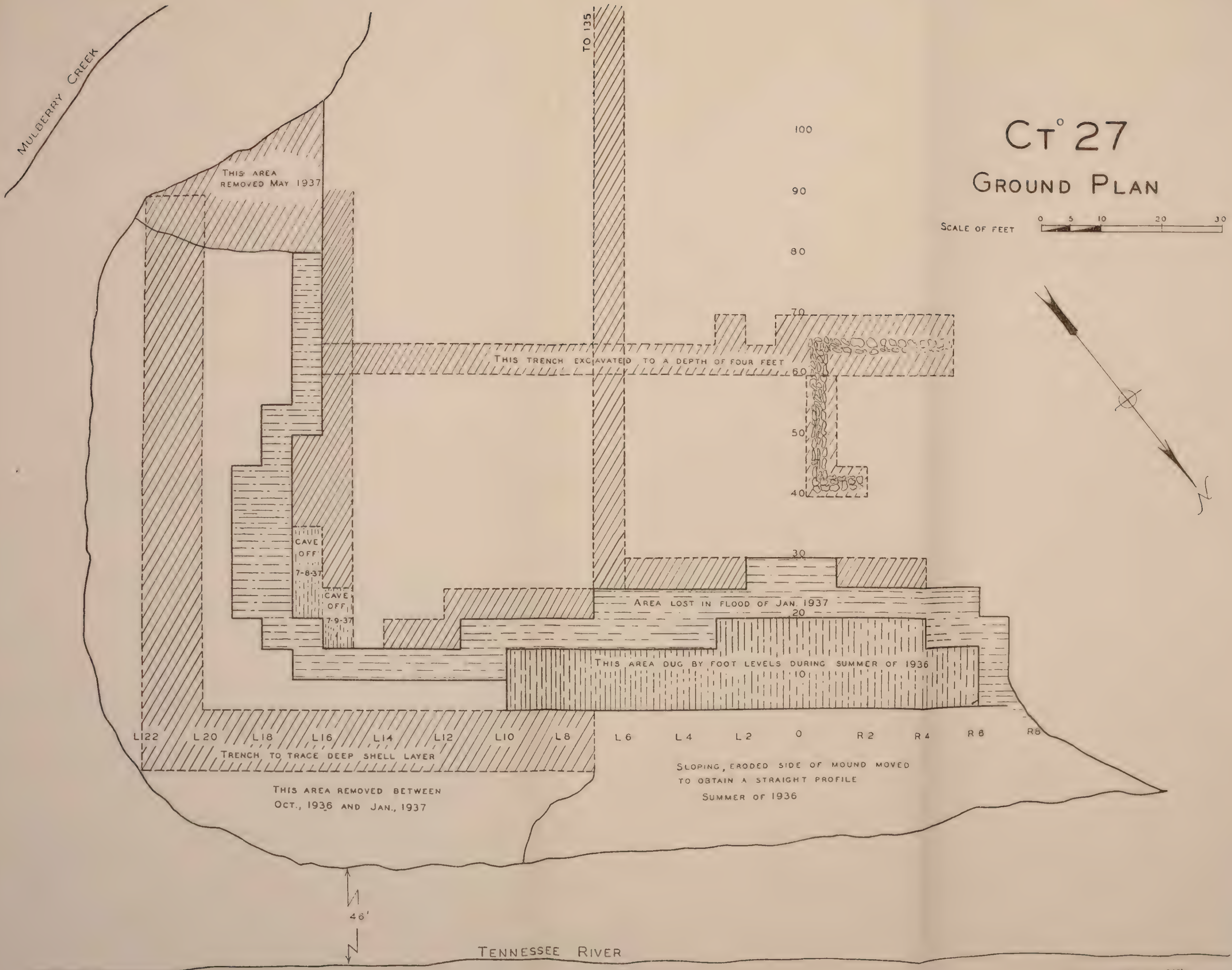

Ct° 27
Ground Plan
Scale of feet
0 5 10 20 30
Mulberry Creek
This area removed May 1937
To 135
100
90
80
70
60
50
40
30
20
10
This trench excavated to a depth of four feet
Cave off 7-8-37
Cave off 7-9-37
Area lost in flood of Jan. 1937
This area dug by foot levels during summer of 1936
L122
L 20
L18
L16
L14
L12
L10
L8
L6
L4
L2
0
R2
R4
R6
R8
Trench to trace deep shell layer
This area removed between Oct., 1936 and Jan., 1937
Sloping, eroded side of mound moved to obtain a straight profile Summer of 1936
46'
Tennessee River
N

Figure 81.

string of cylindrical shell beads about the neck, and several cut bone tools.

Burial 101.—This partially flexed, but disturbed burial was located 18 inches below stake 50L7. It had a necklace of drilled animal teeth, the better preserved portion of which is shown in the second row of plate 289, figure 1.

Burial 119.—This was an intrusive burial in the upper 2 feet of the mound in square 25L19. It was an adult, partially flexed on the back. Near the left scapula was an almost spherical, shell-tempered pot, 6 inches in diameter, with two strap handles and a short vertical neck. Near the left arm were two shell gorgets, shown in upper row at left in plate 288, figure 2, and beside the body were six matched flint points. (See pl. 286, fig. 1.)

Burial 127.—This was a partially flexed juvenile burial in a pit, 10 feet below stake 50L15. With this burial were six bone spatulas, or needles, four of which are shown in plate 295, figure 1, with two small circular shell gorgets in association.

ARTIFACTS

It would be natural to expect that a site showing so many clearly marked natural zones, formed from time to time by the deposit of river sand, would show stratification of artifacts, if any definite cultural changes had actually occurred at the site. This was found to be the case. Stratification was definitely discernible, in the distribution of flint and bone artifacts, as well as pottery. The discussion of the artifacts, therefore, is presented with the evidence for stratigraphy.

DISTRIBUTION OF FLINT ARTIFACTS

A great variety of flint artifacts and flint chips was at once apparent in the excavation of this site. After the north profile was cleared, a compact layer of flint chips some 6 inches thick was observed extending the full length of the profile at about the 9-foot level, as shown in figure 77, and definitely suggesting that at one stage of its occupancy the shell mound had been a shop site. These dark-blue flint chips were evidently struck off by percussion fracture, from larger blocks of flint in the manufacture of rather large and crude blanks. The chips showed no evidence of secondary chipping by pressure. The flint layer was quite compact and the individual chips were reasonably uniform in size and color. Here, then, was definite observable stratification indicative of a change in the habits of the dwellers in the shell mound. The depth of the shell midden, at this point, was approximately 18 feet.

The mound was staked in 5-foot squares in the usual way with the north profile 80 feet long. The artifacts were collected in 1-foot levels, in 5-foot squares, and all the flint material separated out. There were chosen for the basis of this comparison the 5-foot cut and the 10-foot cut extending from L10 to R5, inclusive, a distance of 80 feet.

In order to seek for stratification it was necessary to classify the flint specimens as to types, the occurrence of which could be easily recognized. In a previous study of the flint material from site Lu° 67, some 50 type specimens had been listed, most of which are shown in plates 293 and 294, figure 1. The designation of these types is quite arbitrary. The separation was made partly on a basis of stemmed or not stemmed points. Stemmed types were divided on the basis of whether or not the sides of the stem were expanding, parallel, or contracting toward the base. Other criteria, as the size of the blade, ratio of the length to the width, form of chipping, etc., were used as determiners. It was felt that the purpose of such a classification was not so much the development of a logical method of classification, as it was to set up type forms which could be easily recognized and, therefore, accurately counted in a statistical analysis. By reference to specimens shown in plates 292, figure 2; 293; and 294, figure 1, the type form indicated by number could be observed and used for comparison when separating artifacts into types.

FOOT LEVEL	5 FOOT CUT	10 FOOT CUT	TOTAL
1	39	11	50
2	24	25	49
3	25	30	55
4	46	34	80
5	17	40	57
6	28	33	61
7	38	35	73
8	82	48	130
9	194	224	418
10	143	116	259
11	39	9	48
12	14	16	30
13	21	2	23
14	2	0	2
15	4	2	6
16	3	2	5
17	0	0	0
18	0	0	0
			1346

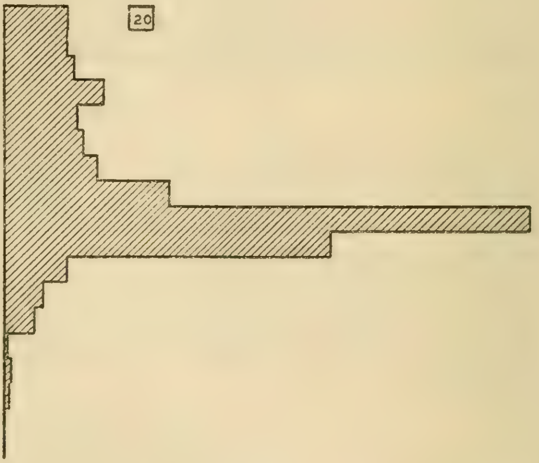


FIGURE 82.—Total distribution of worked flint, all types, from 5- and 10-foot cuts, site Ct° 27.

The content of each 5-foot square on each 1-foot level was classified, counted, and tabulated. It was then possible to prepare charts to show the distribution of each type in the various levels. Table 32 presents this information for the 5-foot cut and table 33 for the 10-foot cut. The summation of these two cuts shows 1,346 specimens for classification, and figure 82 shows their distribution in the various levels. The occurrence of flint in the lower 5 feet of this mound, levels 14 to 18, is so slight as to be negligible. It is apparent that about 5 feet of this shell deposit was accumulated before flint occurred in a significant amount. Such specimens as occur in levels 11 to 13, inclusive, could easily have worked down from superposed layers owing to many causes, among which may be mentioned the intrusion of burials and the digging of pits by the occupants of higher levels, and to the burrowing of small animals. The ground hog is known to have a decided preference for shell mounds as a place in which to make his den. After making a burrow, the ground hog excavates a room by carrying shell out of the burrow and depositing it on top of the mound near the burrow entrance. Later the burrow and den will collapse, allowing the overhead layer of shell to settle many feet. Thus, in various ways material from upper layers is "found" at depths lower than its original province. For these reasons, it is safe to conclude that the occurrence of the relatively small amount of flint in the lower 6 feet of shell midden may be largely attributed to "accidental" intrusion of this flint from upper and later layers. However, at the 10-foot level the site became a flint workshop to which great quantities of quarry products were brought to be worked into artifacts. Here the spalls, rejects, and artifacts broken in manufacture were left to accumulate. This accounts for the very great concentration of flint artifacts in the 9-foot level and adjoining levels as shown in figure 77. Later the extensive working of flint at this site ceased and the mound became once more largely a dwelling site. However, from that time on, a very considerable number of flint artifacts occurred in all later levels, maintaining rather a uniform density of occurrence from the eighth to the first foot level.

TABLE 32.—*Distribution of flint types in 5-foot cut on north profile L10–R5, inclusive, 80 feet, by foot levels*

Type No.	Foot level																		
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19
1	8	5	1	----	----	----	1	----	9	6	1	5	4	2	----	----	----	----	----
2	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
3	1	----	3	4	3	1	2	4	19	11	2	----	2	----	----	----	----	----	----
4	----	----	----	----	1	1	1	----	----	1	----	----	----	----	----	----	----	----	----
6	4	2	4	8	----	1	3	1	----	----	1	----	----	----	1	----	----	----	----
7	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	1	----	----	----
8	2	2	2	3	----	1	----	----	----	----	----	----	----	----	----	----	----	----	----
9	1	1	----	----	----	----	----	1	----	1	1	1	1	----	----	----	----	----	----
10	1	1	----	----	1	----	1	----	----	----	----	1	----	----	----	----	----	----	----
12	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
13	1	2	----	1	----	3	----	----	----	----	----	----	----	----	----	----	----	----	----
14	1	1	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
15	----	----	----	1	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
16	1	2	3	1	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
17	----	1	----	----	1	1	1	3	2	2	4	----	----	----	----	----	----	----	----
18	----	----	----	----	----	----	----	1	1	1	----	----	----	----	----	----	----	----	----
19	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
20	----	----	----	----	----	1	----	1	2	2	----	----	----	----	----	----	----	----	----
21	----	----	----	1	1	----	1	----	----	----	----	----	----	----	----	----	----	----	----
22	----	----	1	3	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
23	2	1	2	----	2	5	4	9	19	12	3	----	1	----	----	----	----	----	----
24	1	----	----	----	----	----	----	1	4	2	----	----	----	----	----	----	----	----	----
25	----	----	1	4	2	3	6	27	59	53	11	3	7	----	2	2	----	----	----
26	1	----	1	10	3	3	7	30	69	45	11	3	5	----	1	----	----	----	----
27	1	----	----	1	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
28	4	----	1	3	1	3	4	1	4	2	4	----	----	----	----	----	----	----	----
29	----	1	3	2	----	1	----	2	----	----	----	----	----	----	----	----	----	----	----
30	----	----	----	1	----	1	3	2	5	4	----	----	1	----	----	----	----	----	----
31	----	1	----	----	----	1	----	----	----	----	----	----	----	----	----	----	----	----	----
32	----	----	----	----	----	----	----	----	1	1	1	1	----	----	----	----	----	----	----
33	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
35	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
37	1	----	----	1	1	1	----	----	----	----	----	----	----	----	----	----	----	----	----
38	----	----	----	----	----	----	----	----	1	1	----	----	----	----	----	----	----	----	----
39	----	----	1	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
41	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
42	----	----	1	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
43	1	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
44	----	2	----	1	----	----	3	----	----	----	----	----	----	----	----	----	----	----	----
45	----	----	1	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
46	5	1	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
47	3	1	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
50	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
52	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
Total	39	24	25	46	17	28	38	82	194	143	39	14	21	2	4	3	0	0	0

TABLE 33.—*Distribution of flint types in 10-foot cut on north profile L10–R5, inclusive, 80 feet, by foot levels*

Type No.	Foot level																		
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19
1	1	1	3		1	1	2	5	7	4	2	5							
2																			
3		1	1	5	4	1		2	25	49	1	1							
4							1		2	1			1						
6	1		3	7	15	8	3		1										
7		1																	
8	1	2	2	2	2	1	1												
9						1		1	5										
10	1				3	1	2	1		1									
12				1															
13	2	5	4		2	3													
14																			
15																			
16		1	1	2	1	1		1											
17			1	1		3	5	4	9	4		1							
18																			
19																			
20																			
21	2	1																	
22	1		2	1	2							1							
23		1	1	6	1	2	1	2	24	6	1	1				1			
24																			
25		2	3		1	3	3	16	55	21	2	3							
26		2	2	6	3	3	6	11	85	29	1	4				1			
27																			
28		2	2	1	3	1	5	1	4	1	2								
29		1			2							1							
30								3	6				1						
31						3													
32																			
33		1					1												
35							1												
37	1																		
38						1		1											
39																			
41				1															
42							2												
43		1					1												
44																			
45																			
46	1																		
47		2	4																
50		1																	
52				1					1										
53							1												
54										1									
55			1																
Total	11	25	30	34	40	33	35	48	224	116	9	16	2	0	2	2	0	0	0
5-foot cut	39	24	25	46	17	28	38	82	194	143	39	14	21	2	4	3	0	0	0
Total	50	49	55	80	57	61	73	130	418	259	48	30	23	2	6	5	0	0	0

As shown in plate 292, figure 2, type 26 is a pointed end of a large and crude knife, or spear point, and type 25 is the broad square end of the same sort of implement. These types (points and bases) are fairly numerous, 289 flint artifacts of type 25 and 348 of type 26 being counted from the two selected cuts. Figures 83 and 84 show their distribution as to depth. The maximum occurrence for each type falls at the 9-foot level and definitely shows that this type of blade was an important product of the shop site at that level. The almost entire absence of these types above the 8-foot level shows that when work at the shop ceased, that type of flint blade ceased to be made at the site. Their discontinuance seems quite abrupt; the few specimens occurring above the 7-foot level could well have been carried up by later occupants from the edge of the mound. Plate 292, figure 2, shows a number of these square ends and points of these crude knives or scrapers. It is worthy of note that the vast majority of these specimens is found broken obliquely, most often the fracture being at the same angle to the median line. It seems obvious that a common cause of fracture was operating here. The angular fracture may have been due to the nature of the material, the manner of manufacture of the blade, or to some peculiar use to which it was put. In any case the broken fragments are much alike. Other types which also show concentration in and about the 9-foot level are type 23, a crude scraper, as shown in figure 85, and types 30 and 34, as shown in figure 86. There is this difference in occurrence, however—type 23 is much more numerous and persists up to the top of the mound. Types 30 and 34, never very numerous, do not extend much above the 7-foot level. Both of these types, it would seem, are products of the early shop-site operation. By reference to plate 293, figure 1, it will be observed how similar, in general appearance, are types 6, 8, 16, and 22. Figure 87 shows the composite distribution of these four types. They were probably regarded by their makers as a single form of projectile. Figure 87 shows the distribution of 107 of these specimens to have reached the maximum at the 4-foot level and to be clearly detached from the work-shop level and its products. It is of interest to note that all potsherds at this site occur in the upper levels of this distribution, which seems to force the conclusion that the makers of the long, narrow-stemmed blades were the users of the pottery at the site. Two other types perhaps deserve mention because of frequency of occurrence. These are type 3 and type 1.

Type 3 is an elongated ovate blade with one squared end. It is crudely chipped and usually of blue flint. Figure 88 shows this blade to occur in quantity in the 9-foot level which is the level of flint concentration, but to occur even more frequently in the 10-foot level, which is the very lowest level to show any concentration of any type. Its occurrence below the 10-foot level is negligible. This would seem

FOOT LEVEL	FIVE FOOT CUT	TEN FOOT CUT	TOTAL
1	0	0	0
2	0	2	2
3	1	3	4
4	4	0	4
5	2	1	3
6	3	3	6
7	6	3	9
8	27	16	43
9	59	55	114
10	53	21	74
11	11	2	13
12	3	3	6
13	7	0	7
14	0	0	0
15	2	0	2
16	2	0	2
17	0	0	0
18	0	0	0
			289

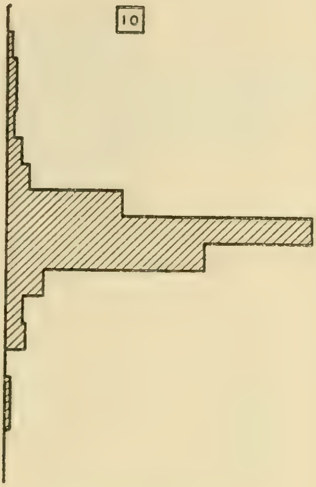


FIGURE 83.—Distribution of flint type 25, site Ct° 27.

FOOT LEVEL	FIVE FOOT CUT	TEN FOOT CUT	TOTAL
1	1	0	1
2	0	2	2
3	1	2	3
4	10	6	16
5	3	3	6
6	3	3	6
7	7	6	13
8	30	11	41
9	69	85	154
10	45	29	74
11	11	1	12
12	3	4	7
13	5	0	5
14	0	0	0
15	1	0	1
16	0	1	1
17	0	0	0
18	0	0	0
			342

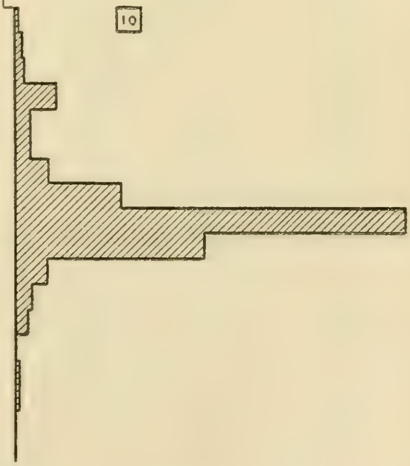


FIGURE 84.—Distribution of flint type 26, site Ct° 27.

FOOT LEVEL	FIVE FOOT CUT	TEN FOOT CUT	TOTAL
1	2	0	2
2	1	1	2
3	2	1	3
4	0	6	6
5	2	1	3
6	5	2	7
7	4	1	5
8	9	2	11
9	19	24	43
10	12	6	18
11	3	1	4
12	0	1	1
13	1	0	1
14	0	0	0
15	0	0	0
16	0	1	1
17	0	0	0
18	0	0	0
			107

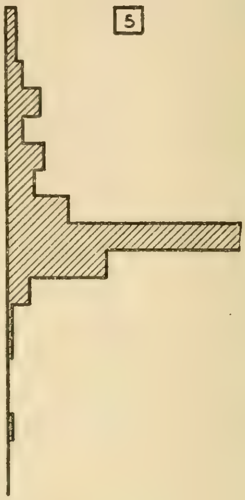


Figure 85.—Distribution of flint type 23, site Ct° 27.

FOOT LEVEL	FIVE FOOT CUT	TEN FOOT CUT	TOTAL
1			
2			
3			
4	1		1
5	0		0
6	1		1
7	3		3
8	2	3	5
9	5	6	11
10	4	0	4
11	0	0	0
12	0	0	0
13	1	1	2
14			
15			
16			
17			
18			
			27

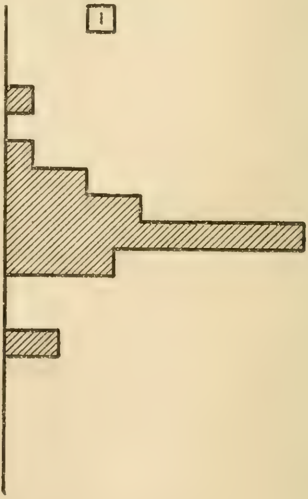


Figure 86.—Distribution of flint types 30 and 34, site Ct° 27.

FOOT LEVEL	FIVE FOOT CUT TYPE				TEN FOOT CUT TYPE				TOTAL
	6	8	16	22	6	8	16	22	
1	4	2	1	0	1	1	0	1	10
2	2	2	2	1	0	2	1	0	10
3	4	2	3	3	3	2	1	2	20
4	8	3	1		7	2	2	1	24
5	0	1			15	2	1	2	21
6	1				8	1	1		11
7	3				3	1	0		7
8	1				0	0	1		2
9	0				1				1
10	0				0				0
11	1								1
12									0
13									0
14									0
15									0
16									0
17									0
18									0
									107

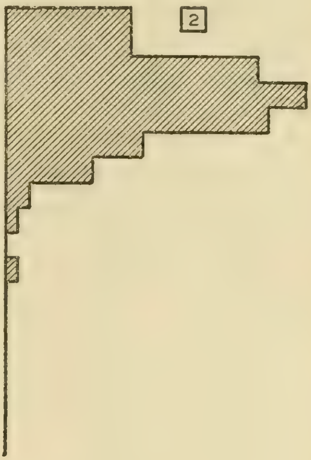


FIGURE 87.—Distribution of flint types 6, 8, 16, and 22, site Ctº 27.

FOOT LEVEL	FIVE FOOT CUT	TEN FOOT CUT	TOTAL
1	1	0	1
2	0	1	1
3	3	1	4
4	4	5	9
5	3	4	7
6	1	1	2
7	2	0	2
8	4	2	6
9	19	25	44
10	11	49	60
11	2	1	3
12	0	1	1
13	2		2
14			0
15			0
16			0
17			0
18			0
			142

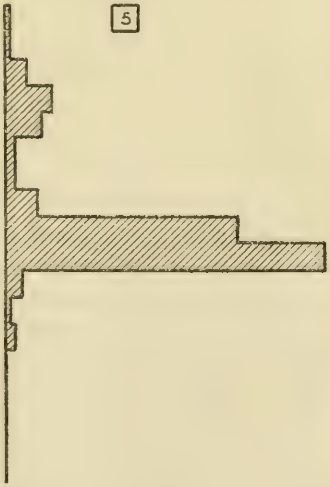


FIGURE 88.—Distribution of flint type 3, site Ctº 27.

to be the earliest type made at this site and to have preceded, if indeed it did not lead to, the manufacture of the larger blades, fragments of which form types 25 and 26, the concentration of which is in the 9-foot level. These last two types occur in quantity in the 10-foot level also, and thus the early association of type 3 with types 25 and 26 is demonstrated.

Type 1, a relatively short unnotched blade with a square end, also has maximum frequency in the 9-foot level as shown by figure 89; however, the chart seems to suggest a second maximum in the 1-foot level. It would be interesting if such a conclusion could be established, but danger lies in the fact that the data from the surface level is highly unreliable due to additions and subtractions to the surface-level content since the original occupancy. In this case, as was shown, the use of flint extended from the 9-foot level to the surface. This second maxima is probably due to the use at this site of a "later model" of crude unnotched blade, which so nearly resembled the earlier type 1 that it could not be distinguished from it in the count.

FOOT LEVEL	FIVE FOOT CUT	TEN FOOT CUT	TOTAL
1	8	1	9
2	5	1	6
3	1	3	4
4	0	0	0
5	0	1	1
6	0	1	1
7	1	2	3
8	0	5	5
9	9	7	16
10	6	4	10
11	1	2	3
12	5	5	10
13	4		4
14	2		2
15			0
16			0
17			0
18			0
			74

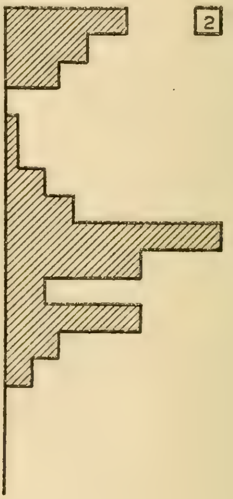


Figure 89.—Distribution of flint type 1, site Ct° 27.

The other types listed in tables 32 and 33 seem to occur in such limited frequency that conclusions drawn therefrom are uncertain. However, while the types 7, 13, 18, and 27 are relatively rare, it may be worth while to note that they are negligible in amount below the 6-foot level, and they appear to have a maximum at the 2-foot level, which is the center of the pottery layer. This would seem to indicate that they are associated with the users of the pottery.

Attention has been called to burials Nos. 83, 84, and 85, which were below the mound proper and must represent very early interment at this site. It should be noted that projectile points taken from these bodies (pl. 289, fig. 2) do not in general correspond to types of flint artifacts found generally through the mound. There can be no doubt that these three individuals were killed by these arrow points. It seems equally certain that these points may be regarded as foreign to this mound.

BONE ARTIFACTS

Bone awls were often made by splitting the cannon bone of deer as shown in plate 287, figure 1. This bone was also used to make bone projectile points of two sizes—the short size, about 2½ inches long; and the long size, about 4½ inches long. These were not numerous at this site but a careful check on the total finds from all of the excavations reveals 57 bone projectile points and 98 split-bone awls. Their distribution is shown in figure 90. While the number is perhaps too small to show a definite maximum, yet it would seem reasonable to conclude from their distribution that these points and awls were used from the bottom layers up through the 9-foot layer. At that level the flint workshop began and the use of split bone seems to have diminished, the bone-projectile points most rapidly, and both points and awls disappearing in the 4-foot level, none being found in the pottery zone. It would appear certain that their maximum use occurred before the use of flint came to be important on this site.

Other bone artifacts—fishhooks and atlatls, shown in plate 298, figure 2—and certain ground-stone artifacts—pestles, grooved axes, lapstones, and perforated stone cylinders, shown in plate 290, figure 2, and plate 294, figure 2—occur in this region, but in numbers too small to draw any certain conclusions. Their distribution in depth is shown in figure 90. In table 34 is shown the distribution of antler spear points, antler drifts, and other worked-antler objects, as well as the occurrence of other traits in the upper levels of this mound. It is interesting to note that the use of worked-antler spear points—drifts—and other antler objects began just after the 9-foot level was laid down. It is to be remembered that one of the important products produced by the flint workshop at the 9-foot level was a flint blade well adapted to the cutting of horn. Before these knives were produced there seems to have been no cut antler at this site. Antler objects continued upward from the 9-foot level, through the pottery zone, to the mound surface. In this region worked-shell specimens were most numerous as shown by table 34. As pointed out in discussing burial forms, the only type of burial occurring at this site not generally common to other shell mounds so far investigated is the pit burial of a body in a sitting posture. These are usually placed on or near fire-burned clay hearths. The occurrence of such burials and hearths is shown in table 34 to be in the same general region as the antler artifacts, definitely concentrated in the levels above the shop-site level, in a region of abundant flint. Types of antler drifts are shown in plate 286, figure 2. It is not surprising they should be associated in levels containing much flint. Flint knives may have been used in cutting them, but it is also probable that they served as tools in flaking flint by indirect percussion fracture.

FOOT LEVEL	BONE POINTS	BONE AWLS	FISH HOOKS	ATLATLS	PESTLES	LAP-STONES	STONE CYLINDERS
1							
2			1		1		
3					3		POTTERY LEVEL
4	1	4	1				
5	1	6					
6	1	10					
7	1	7					
8	5	8				5	FLINT WORKSHOP LEVEL
9	4	7		1			
10	4	14		1			
11	15	8				3	
12	9	10					1
14	6	8	2		1	1	
14	5	10					1
15	3	5					
16	1	1					
17	1						
18							

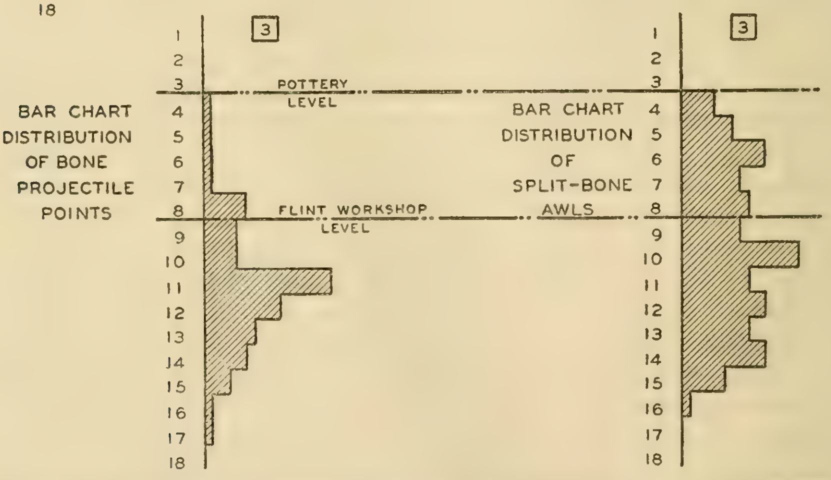


Figure 90.—Distribution of bone and stone, associated traits, from 5- and 10-foot cuts, site Ctº 27.

In plate 287, figure 2, and plate 288, figure 1, are shown many carved bone awls and spatulas. Most of these are the more carefully worked specimens which were taken from burials. A few may have been pins used in fastening garments. The two large spatulas similarly carved, shown in plate 287, figure 2, seem to be exact duplicates and may have been used as weaving tools. They are about 14 inches long, and were taken from burial No. 80. They are shown in situ in plate 281, figure 2. Plate 295, figure 1, shows four of the six bone hairpins taken from burial No. 127. The longest of these is 12 inches. All were found much broken. Their cylindrical shafts and flat perforated heads would suggest their possible use as needles. This burial, No. 127, is shown with artifacts in situ in plate 285, figure 1.

TABLE 34.—*Distribution of burials in sitting posture with associated traits—data from 5-foot and 10-foot cut and L17 and L16, adjusted to equivalent base level*

Foot level	Antler spear points	Antler drifts	Worked antler [1]	Stone gorgets	Worked shell	Clay hearths	Seated burials	Remarks
1	2	2	2	--------	1	--------	--------	
2	3	1	3	1	1	--------	--------	
3	2	--------	4	--------	2	2	1	Pottery level.
4	1	--------	1	1	1	2	4	
5	--------	--------	2	--------	2	2	6	
6	3	1	1	1	--------	2	1	
7	--------	--------	2	--------	1	--------	--------	
8	1	1	3	1	--------	3	2	
9	--------	--------	--------	--------	1	4	2	Flintwork shop level.
10	--------	1	--------	--------	3	3	1	
11	--------	--------	3	--------	--------	2	1	
12	--------	--------	--------	--------	--------	--------	--------	
13	--------	--------	--------	--------	1	--------	--------	
14	--------	--------	--------	--------	--------	1	--------	
15	--------	--------	--------	--------	--------	--------	--------	
16	--------	--------	--------	--------	--------	--------	--------	
17	--------	--------	--------	--------	--------	--------	--------	
18	--------	--------	--------	--------	--------	--------	--------	
Total	12	6	21	4	13	21	18	

[1] Worked antler is any antler material showing work other than spear points, drifts, or atlatls.

One of the most interesting bone artifacts from this site is the bowl made from a human skull. This bowl, crushed into many pieces, is shown restored in plate 298, figure 1. This vessel has a maximum length of 7¼ inches and maximum breadth of 5¼ inches with the greatest depth 3⅛ inches. It is made from the upper half of the skull cap. The cut edges are beveled, rounded and smooth, and the holes are drilled on opposite sides as if to attach a suspension. It could thus have served as a pendant or gorget. The skull from which this vessel was cut had a very decided flattening in the posterior portion of the parietal, and shows a very prominent sagittal crest. The manufacture of such an artifact may be a partial explanation of the occasional finding of "headless" burials at this site.

It appears that in most shell mounds there is some evidence to indicate that atlatls were generally used and that occasionally the hook portion of the atlatl was made of bone or horn. Plate 298, figure 2, shows three cut bones, which have been worked—drilled and fashioned into what are deemed to be hooks for atlatls. The bone object on the left is drilled nearly through and the lug on one side of the nearly cyclindrical bone, has on its straight face a definite blunt pointed protuberance. It is believed that this was useful in "seating" the end of the shaft to be thrown. The central object in the figure is a simple hook of bone which was probably lashed onto a short wooden shaft to form an atlatl. The third bone object, on the right in plate 298, figure 2, is a section of bone drilled nonsymmetrically for the insertion of a large shaft. The square face of this cut bone also carries a blunt pointed protuberance, opposite the large hole for the shaft. This cylinder when mounted on a shaft would make a good atlatl hook.

The number of such hooks found is not large. This might be expected, since it is highly probable that wood was generally used for making atlatls, and the use of bone hooks for that purpose was probably rare, although atlatls of wood may have been common.

POTTERY

Pottery at this site occurred only in the upper 3 feet of this mound. A total of 2,470 sherds—the entire collection taken from certain cuts, selected because of a minimum of erosion and disturbance—was used in a study of the wares present and their distribution. All five of the wares found in Pickwick Basin were present at this site. The following tabulations show the percentage of each type and subtype and their distribution by foot levels, in certain selected cuts.

Pottery distribution by types[1] *in site Ct° 27*

Fiber, type 1 ware:

	No.	*Percent*
1a	26	72. 4
1b	2	5. 5
1c	6	16. 7
1d	1	2. 8
1e	1	2. 8
Total	36	100. 0

Sand, type 2 ware:

	No.	*Percent*
2a	10	29. 3
2b	9	26. 5
2d	1	3. 0
2bf	1	3. 0
2dg	1	3. 0
2f	6	17. 6
2g	3	8. 8
2i	3	8. 8
Total	34	100. 0

Limestone, type 3 ware:

	No.	*Percent*
3a	72	32. 6
3b	141	64. 0
3c	3	1. 3
3d	1	. 4
3bg	2	. 9
3g	1	. 4
3h	1	. 4
Total	221	100. 0

Clay and grit, type 4 ware:

	No.	*Percent*
4a	417	50. 7
4b	127	15. 5
4d	162	19. 7
4e	108	13. 3
4g	2	. 2
4h	5	. 6
Total	821	100. 0

Shell, type 5 ware:

	No.	*Percent*
5a	81	98. 8
5c	2	1. 2
Total	83	100. 0

---

[1] For explanation of type symbols, see table 1, p. 525.

TABLE 35.—*Pottery distribution by types and depth in site Ct° 27*

Foot level	Pottery types										Total	
	Fiber tempered		Sand tempered		Limestone tempered		Clay-grit tempered		Shell tempered			
	No.	*Pct.*	*No.*	*Pct.*	*No.*	*Pct.*	*No.*	*Pct.*	*No.*	*Pct.*	*No.*	*Pct.*
1	26	1.7	27	1.7	169	10.6	1,220	79.0	109	7.0	1,551	100
2	8	1.0	13	1.6	93	11.1	692	81.9	37	4.4	843	100
3	2	2.6	------	------	22	29.0	48	63.2	4	5.2	76	100
Total	36	1.3	40	1.5	284	11.4	1,960	79.9	150	5.9	2,470	100

An examination of these results shows the dominance of the clay- and grit-tempered ware on this site. This is not comparable to any of the other shell mounds and, perhaps, indicates that the center of development and dispersal of the clay-grit ware was at this site.

The amount of fiber-tempered ware is quite small and the little that does occur here is found in the upper portions of the pottery zone. The vessels were apparently the same types as found on the other shell mounds, i. e., large bowls with straight sides and rim. Only five of the subtypes of this ware were found at Ct° 27.

The sand-tempered ware is also rare, but a variety of subtypes have been found (pl. 295, fig. 2). The rims illustrated indicate that the vessels were large jars with slightly flaring mouths.

Limestone-tempered sherds constituted only 11.4 percent of the sherds found but it is the second most common type of ware. Within this ware the textile-impressed subtype was 64 percent of the total. A subtype not seen elsewhere is the 3bg in which lines have been incised over a textile-impression. (See pl. 296, fig. 1.) These occur on vessels of straight sides and rim. There is a very slight flare at the lip.

The clay-grit ware constitutes 79.9 percent of the total sherds. This percentage is far greater than that shown by any ware on any other shell mound and indicates that the people responsible for this ware either lived here a long time or in great numbers. The subtypes represented are dominantly plain (4a), cord-wrapped paddle (4b), rhomboidal stamp (4d), and rectangular stamp (4e). These are shown in plate 296, figure 2, and plate 297, figure 1. One sherd of subtype 4c with punctations in incised lines was found. This latter sherd was one rim sherd from a vessel of square cross section and apparently of greater depth than diameter. This sherd is shown in lower row, right, of plate 296, figure 2.

The shell-tempered ware is 98.8 percent plain ware. Some of the rim sherds are from bowls and some of these rims have small nodules about 1 cm. from the lip. One sherd was found bearing incised lines in a haphazard fashion. Textile-impressed sherds may be salt pan as the ware is thick and shows little curvature. A few of these sherds are shown in the lower row of plate 296, figure 1.

Plate 297, figure 2, shows two shell-tempered vessels from a burial, No. 15, very close to the mound surface. The water bottle is 5½ inches high and 3½ inches in diameter at the mouth. The small cup is nearly 4 inches in diameter, both of type 5a, plain.

From the preceding discussion it is obvious that stratigraphy at this site is apparent, in spite of the many agencies, past and present, which work to obscure the record. An attempt has been made to integrate information from profiles and distribution charts and to present this combined result in a "generalized profile," which does not necessarily represent the exact facts at any particular portion of the mound, but which does very exactly represent the average of the information available. When one considers that shell mounds are built of lenses of shell, sand, clay, flint, and earth, which vary in thickness from a few inches to many feet and sometimes "pinch out" and disappear as different portions of the mound are explored, the necessity of attempting to integrate such a body of information becomes apparent. The correctness of any conclusions drawn from stratigraphy on any site necessarily depends on the validity of the stratigraphy. It must be emphasized here that all data used in charts, tables, and as the basis for the "generalized profile" were taken from the north profile from the 5-foot cut and the 10-foot cut between stakes L10 to R5. No data from any part of the east profile were used and none from any part of the north profile adjacent to it was used since, as shown in plate 283, the dip of the lower shell layers along the creek (east) face to a depth of about 24 feet made depth distribution meaningless in that region. In the portion of the mound used to obtain data, the deposition of natural zones was as nearly level as ever exists in any shell midden, as shown by plate 269 and plate 271, figure 2. Further, while it is a fact that work was done only on the mound periphery as it existed at the time of excavation, yet, this is no reason to believe that the 5-foot cut and the 10-foot cut were actually on the edge of the mound as it was laid down. The nearly vertical river face of the midden, as shown in plate 269, figure 1, and plate 284, was about 100 feet distant from the river edge on a flat river terrace. This seems to indicate that the river had eroded this shell bank back from the river edge to the nearly vertical face as it existed at the time of excavation. Its flat top and nearly vertical wall would seem to indicate that the exposed river face of the midden may very well be near the actual center of the midden as it was first deposited. The face was cut down, and a vertical profile with level strata showing no erosion or disturbance was exposed before the cuts were made from which data were taken.

The "generalized profile" is, therefore, an attempt to show in a somewhat graphic way the chronological order of events as they seem to have occurred at this site. In presenting such a body of information, it should be noted that, in attempting to find the exact boundaries between the different zones representing the different cultural traits, the lower boundary in shell mounds seems always to be more easily ascertainable than an upper boundary. It seems comparatively easy to find at what level a custom or trait began to be used, but difficult to set an upper boundary where it may truly be said to have been discontinued.

It would appear that in shell mounds, when a trait began, it developed rapidly to a maximum occurrence, and often then began to diminish, sometimes, apparently, because of the substitution of some other trait. However, in general, the earlier trait was never quite completely abandoned. There seems to have been a tendency to continue to use a type of artifact long after its use had reached a maximum and its usefulness had begun to decline. This tendency to "carry over" the use of earlier traits into a region where improvements have already begun to appear tends to make the upper bound-

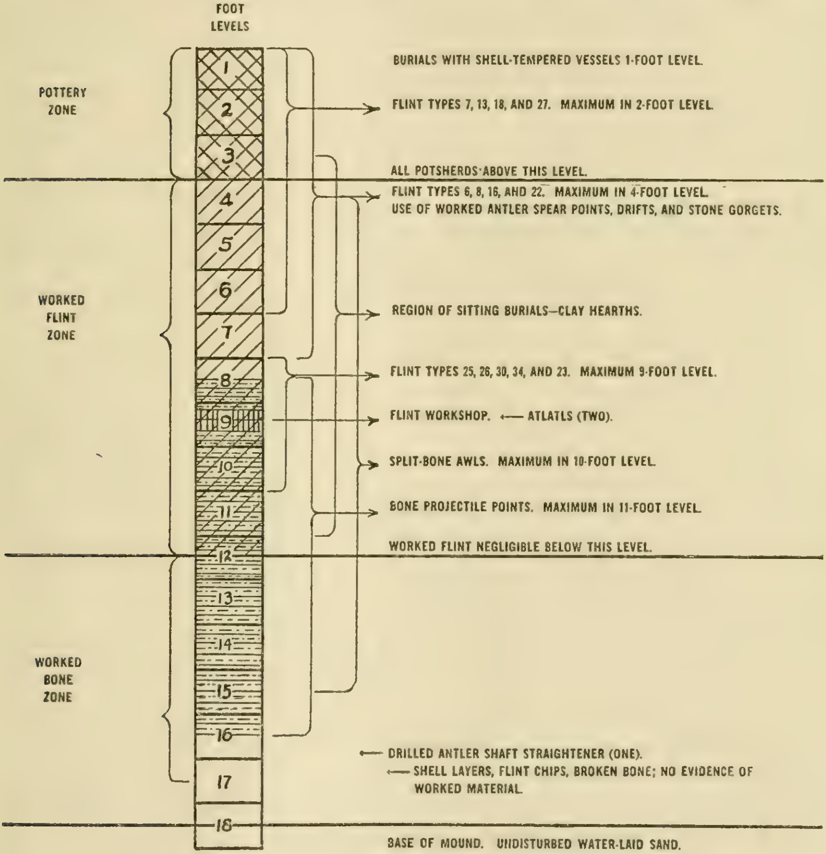

FOOT LEVELS
POTTERY ZONE
WORKED FLINT ZONE
WORKED BONE ZONE
1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
BURIALS WITH SHELL-TEMPERED VESSELS 1-FOOT LEVEL.
FLINT TYPES 7, 13, 18, AND 27. MAXIMUM IN 2-FOOT LEVEL.
ALL POTSHERDS ABOVE THIS LEVEL.
FLINT TYPES 6, 8, 16, AND 22. MAXIMUM IN 4-FOOT LEVEL.
USE OF WORKED ANTLER SPEAR POINTS, DRIFTS, AND STONE GORGETS.
REGION OF SITTING BURIALS—CLAY HEARTHS.
FLINT TYPES 25, 26, 30, 34, AND 23. MAXIMUM 9-FOOT LEVEL.
FLINT WORKSHOP. ← ATLATLS (TWO).
SPLIT-BONE AWLS. MAXIMUM IN 10-FOOT LEVEL.
BONE PROJECTILE POINTS. MAXIMUM IN 11-FOOT LEVEL.
WORKED FLINT NEGLIGIBLE BELOW THIS LEVEL.
← DRILLED ANTLER SHAFT STRAIGHTENER (ONE).
← SHELL LAYERS, FLINT CHIPS, BROKEN BONE; NO EVIDENCE OF WORKED MATERIAL.
BASE OF MOUND. UNDISTURBED WATER-LAID SAND.

FIGURE 91.—Generalized profile of site Ct° 27.

aries of zones of occurrence difficult to determine. This perhaps is to be expected, since man does not forget what he has learned as abruptly as he may discover an improved process or a source of new material for artifacts.

GENERALIZED PROFILE

By reference to the "generalized profile" (fig. 91), it will be seen that there are three broad zones easily distinguished.

Covering the top of the mound, the pottery zone is about 3 feet deep. The worked-flint zone, which is about 8½ feet thick, lies under the pottery zone and contains absolutely no pottery. However, certain of the important flint-type forms which began deep in this nonpottery zone extend up into the pottery zone. Below the nonpottery zone of worked flint is a zone about 6 feet in thickness which contains only worked bone of the simpler types. In the lower 2 feet of this zone even worked bone artifacts are rare. The shell layer is almost pure shell. There are a few flint chips, broken river pebbles, and broken bones, but the region is practically devoid of evidence of workmanship in the arts of manufacture.

Briefly then, the order of events seems to indicate that this mound, about 18 feet deep on the average, was started by the deposit of shell carried up from the river. Doubtless the shellfish were eaten and their extraction from the shell accomplished by the aid of, perhaps, stone hammers and bone splinters, but nothing appears to indicate the intentional manufacture of artifacts in the lower 2 feet of shell, save one artifact, a section of horn having a hole drilled through it. This may have been a "shaft straightener" and may suggest that at this period most "tools" were made of wood or bone.

It has been explained how the shell layers alternate with layers of river-deposited sand and silt. In the 16-foot level, bone projectile points began to appear and in the 15-foot level split-bone awls make their appearance. These increase in number and reach a maximum occurrence, respectively, in the 11-foot and 10-foot levels. Not until the 12-foot level is reached does one find any worked flint. There are at first only the crudest forms of knives and scrapers, and they are not numerous. In the 10-foot level notched projectile points begin to appear, and in the 9-foot level immediately above the shell is displaced by the concentrated remains of a flint workshop. Before the workshop was established, flint was scarce, but after that, quite abundant to the top of the mound. However, there were many changes in type forms. Types 23, 25, 26, 30, and 34 all reached a maximum in the shop-site level, and all were practically discontinued in the next 1½ feet of deposit. As these types terminate so also does the bone projectile point cease, but the split-bone awls continue on upward for 5 more feet, nearly to the zone of pottery, to discontinue in the 4-foot level. In the 7-foot level, after these flint forms and bone projectile points ceased to be used, there began to be used a long slender flint point having a stem, as shown in types 6, 8, 16, and 22. These grew more numerous to the 4-foot level, where they reached a maximum below the pottery zone, but continued to appear in a decreasing, but still considerable, number up to the top of the mound. Shortly after this type of flint blade began to be used, in the 6-foot level there began to be used, also, a broad, short, triangular-shaped blade with deep basal notch and distinct stem, as represented by types 7, 13, 18, and 27. These increased in number and reached a maximum in the 2-foot level well within the pottery zone.

It would seem to be certain that both of these flint groups, starting one in the 7-foot level and the other in the 6-foot level, were used by the people depositing the pottery layer. Thus, just as the use of worked-bone artifacts, beginning in a nonflint region extend into the worked-flint region and disappear, so these types of flint forms, beginning after the flint workshop level, extend into the pottery zone.

At a depth of about 10 feet there began the practice of building clay floors for fires on the shell mound. These smooth clay hearths were burned hard by the fires built upon them, and about them the dead were often buried in a sitting posture in a pit. This custom continued up to about the 4-foot level, and appears to antedate the use of pottery. Associated with the long slender flint blades, beginning in the 7-foot level, is the use of the antler for the manufacture of conical spear points. Usually small sections of horn tips, scraped to a point and drilled at the base to receive a shaft, were used for this purpose. With these were also blunt short sections of antler, many of large diameter, which were probably used as drifts in flaking flint by percussion. These antler artifacts continued to be used into and throughout the pottery zone.

The pottery zone consists of the upper 3 feet of the mound. All potsherds are in this zone. All types common to the basin are found within the zone, but no stratigraphy is apparent. In the surface 1-foot level, almost within the plow line, are found extended burials having shell-tempered pottery vessels as burial offerings. Pottery is not used at this site, with any other burials. Shell-tempered ware only is used, as burial offerings, and that only in the superficial 1-foot level.

Finally, while it seems certain that stratigraphy of a kind is demonstrated at this site, yet it does not seem possible to consider these cultural changes as the result of a shifting population. The removal of one people and their replacement by another might account for the abrupt introduction of new customs somewhat as observed at this site, but it could hardly account for the retention of older traits by a later people. It would be especially difficult to see how a later people could retain a series of cultural associations in the same proportions as existed before their advent.

The introduction of pottery, which came quite abruptly, as shown by the stratigraphy of the site, is accompanied by the use of exactly the same type of flint artifacts as before. In fact, two groups of flint projectile points, beginning many feet down in the nonpottery zone, are most numerous in the pottery zone.

These facts seem to suggest that such changes, as are apparent throughout the long history of this site, are wholly owing to the changes in material culture of a single people over a long time. These changes were doubtless, in part, the product of their own efforts to meet and solve the problems of their cultural economy, and also in part may be the result of initial contacts with other peoples, perhaps more advanced, from whom the dwellers on these shell mounds could learn new methods and techniques. Whatever may be the explanation of the stratification which is observable, there can be no doubt of the continuity of many customs across what seem to be normal zone boundaries.

What caused the final desertion of this site by this people is not apparent, but it is probable that the shallow extended burials in the surface of this mound, accompanied by shell-tempered pottery vessels, represent a separate people, the last to inhabit the site. It would appear that this phase of occupancy was not long and of relatively minor importance in the long history of the site.

Georgetown Landing, Site Ct° 34

On the flood plain of the Tennessee River, 6 miles north of the town of Cherokee, Ala., was a low shell midden. This site was but a short distance from an old boat landing of Civil War days known locally as Georgetown Landing. The site at the time of excavating was the property of the Tennessee Valley Authority but had formerly been the property of Mr. Goodloe. The exact geographical location was SE ¼, sec. 25, T. 2 S., R. 14 W. The mound was one of a series of shell middens that line the south bank of the river in this particular section of Colbert County. The visible limits of the mound indicated a midden approximately 140 by 280 feet. Because of the flatness of the site, it had been cultivated for many years but at the time of excavating was only a hay field.

METHOD OF EXCAVATING

Excavation was started late in January in 1938 as it was thought best to obtain material from as wide an area as possible. Because of the limited time before the proposed flooding of Pickwick Basin, an extensive excavation was not planned. An area 30 by 30 feet was staked near the center of the mound. A 20-foot block was to be outlined by cutting trenches on the four sides of the area. This block would then be zoned and excavated by horizontal cutting. Plate 304, figure 1, shows the start of this excavation. Excavation was well under way when on February 15, 1938, a full month before the announced time, the site was flooded almost overnight and before the supervisor in charge could recover his tools and equipment.

BURIALS

Only nine burials were recovered in the short period of excavation. Of this number, one was an infant and, therefore, not considered in the burial classification. The other eight burials were classified as follows:

Foot level	*Type and No.*
1	None.
2	None.
3	2–1A, 1–5A.
4	5–5A.
5	None.
6	None.
7	None.

It will be noticed that the excavation reached 7 feet, but that burials did not occur deeper than four. This may be explained by the small area excavated. Plate 304, figure 2, shows a typical sitting burial.

POTTERY

The site yielded 41 sherds. Of this number, 31 were shell tempered and 10 were fiber tempered. As to depth, 33 occurred in the first foot level and the remaining 8 in the second foot level. There was no evidence of pottery at deeper levels, even though the excavation reached the 7-foot level in the 5-foot trench. Further conclusions are not drawn due to the small amount of material.

FLINT

Of flint artifacts, there were 33 pieces. These showed a fairly uniform distribution from the top to the 7-foot level. It must be remembered that the bottom of this mound was never reached as flooding prevented the continued excavation. The flint points were typical of shell-midden material. Further conclusions are not warranted owing to the meager information obtained.

SPECIAL ARTIFACTS

Ten artifacts were listed as field specimens. These were distributed as follows:

- 3 bone projectile points.
- 1 bone pin.
- 1 antler spear point.
- 1 shell bead.
- 1 stone bead.
- 1 bone scraper.
- 1 flint point.
- 1 cut antler.

CONCLUSIONS

Ct^{o} 34 was a typical shell midden of the region. It consisted of an accumulation of midden material of undetermined depth. Flint projectile points extended as deep as the excavation went. Pottery was more superficial occurring only 2 feet deep. Burials were mainly of the sitting type and seemed to be stratified into a 2-foot zone occurring in the 3- and 4-foot levels. All field specimens were typical shell-mound materials.

Site Ct^{o} 34 might have been an important focus in the shell-mound complex, but, owing to the short time spent in excavating and to the meagerness of the material, one is not justified in drawing very definite conclusions.

Georgetown Cave, Site Ct^{c} 42

On the south bank of the Tennessee River and approximately 1 mile upstream from Georgetown Landing was Georgetown Cave. This cave in SE¼ sec. 6, T. 3 S., R. 13 W., was the only cave excavated in Pickwick Basin. The cave had long been known and used by local fishermen as a camping place during rainy weather. At the time of excavating the cave was the property of the Tennessee Valley Authority but had formerly belonged to Mr. Brewer of Sheffield, Ala. The entrance of the cave was an opening 9 feet high by 35 feet wide which occurred in the limestone bluff 40 feet above the level of Pickwick Lake. Plate 305, figure 1, shows the cave entrance. The cave extended into the hill at a uniform size for a distance of 80 feet; at that point there was a drop of 15 feet caused by the caving of the floor brought about by water dissolving away the limestone beneath. The floor of the cave was covered by a layer of soil that averaged above 2½ feet in thickness.

METHOD OF EXCAVATING

Excavation was begun on February 24, 1938, when premature flooding of Pickwick Basin brought about a crisis in the work schedule. There was considerable soil rubble and leafmold lying along the face of the cliff from the top of the cave floor to the valley bottom. A trench was begun at the rim of the cave and extended down the face of the cliff, cutting through the soil to bedrock in an effort to find if any midden material had been thrown out of the cave. This trench yielded nothing which indicated that the cave was ever occupied for a very long period of time. The floor of the cave was staked in 5-foot squares and excavated by vertical slicing.

It was quite evident that most of the floor had been dug before. This was easy to explain because of the many local legends concerning "buried treasure" in the cave. A profile of the excavation was drawn every 5 feet which gave the contour of the rock floor and a cross section of the soil on the floor. The lower foot of soil was a brilliant red clay typical of the soil on the fields about the cave. On top of this clay there was from a foot to 2 feet of black-cave earth. It was this layer of black earth consisting of leafmold, bat dung, and rubble that had been particularly disturbed by the "treasure hunter." All soil was removed from the floor for a distance of 80 feet. Because of numerous drips certain portions of the soil was so impregnated with travertine that excavation was impossible.

BURIALS

Four burials or fragments of burials were encountered. All were badly disturbed and in no case was there the skeleton of a complete individual.

POTTERY

Stratigraphy was not found in the pottery because of the shallowness of the soil layers. There were 15 pottery sherds in the cave. Of these seven were of limestone temper, three of clay-grit temper, three of sand temper, and two of shell temper. In addition there was one sandstone vessel fragment.

ARTIFACTS

The excavation yielded the following artifacts:

1 shell gorget.
1 copper gorget.
1 slate gorget.
1 pestle.
1 antler spear point.
1 bone flaker.
3 bone awls.
1 pearl bead.
31 flint points.

The most notable of these can be seen in plate 305, figure 2. In the upper left corner is a copper gorget made of sheet copper 4½ inches. by 2½ inches. Beneath is a very fine antler spear point 4½ inches in length; to the right of this is the fragment of a highly polished slate gorget 3½ inches long. The center piece of the picture is a shell gorget or spoon 7 inches in length. The rest of the plate has been devoted to projectile points with flaking of a very high type.

CONCLUSIONS

Site Ct^{c} 42 was a cave of probably late occupation. This is evident by the fine workmanship of the few artifacts found. The site was probably used more as a temporary shelter than for permanent dwelling as no extensive fired areas or midden material was discovered. Vandals and "treasure hunters" have destroyed most of the record that the cave contained.

THE ATLATL AND THE BONE POINT

As the result of finding certain carved bone and horn hooks in the shell mounds of northern Alabama—both in the Wheeler Basin and in Pickwick Basin—considerable interest attaches to a possible interpretation of their use. It is believed these hooks were the distal ends of atlatls, or throwing sticks. It has generally been considered that the bow and arrow came into use in North America in comparatively recent times, and that, antedating the use of the bow, projectiles were cast with the "throwing board," or atlatl. This assumption is supported by a variety of evidence. It is well known that the "throwing stick" early came into use in Mexico and became a significant symbol of the culture of which it was a part.

Like other primitive peoples, the Eskimo began the use of the atlatl very early in their development. Because of their peculiar environment, the throwing stick was so well suited to their needs that it has not even today been entirely superseded by the bow and arrow. In the light of these facts, it is generally assumed that in very early times the atlatl had a wide distribution over all of North America; it had been superseded, in certain favored areas, by the bow and arrow only a few centuries before the coming of Columbus. In order to correctly evaluate this new evidence from northern Alabama, it is helpful to understand the occurrence of the atlatl in other portions of North America.

According to Nuttall (1891) the spear-thrower in ancient Mexico had a curious but very interesting development. In its early stages, the atlatl was used only by fisher folk to cast a harpoon to secure fish—and perhaps waterfowl. The spear, which was thrown by it, carried one end of a cord; the other end of which was retained by the hunter. By this cord the spear could be recovered, and any fish or bird thus harpooned could be more easily taken. The spear-thrower became an important war implement for many of the earlier peoples of Mexico and Central America; for the Aztec it finally became a symbol of rank and an emblem of certain deities. As such, it was elaborately carved, beautifully inlaid with precious stones, and painted and decorated with feathers. Having attained ceremonial significance in the Maya hands, it became a significant symbol in ancient sculptures and codices.

Finally, its use as a war implement was abandoned. Being superseded by the bow and arrow, its utilitarian use ceased altogether.

Of the atlatl, Nuttall says:

> We seem to see the native huntsman using it, in its simple, primitive form, to launch the harpoon at the fish and aquatic fowl of his native lagoons or hurl it in savage warfare at his enemy. In numerous pictures we find it exhibiting elaborate decorations, curious conventional forms, and serving as a mark of chieftainship and priestly rank. We finally recognize ceremonial forms of the atlatl in the hands of Aztec deities and in the precious emblem borne aloft in certain religious processions. The following data prove, beyond a doubt, that the atlatl was in general use, in each of these forms, at the time of the Conquest, although it soon fell into disuse and became extinct. . . . The atlatl, although exquisitely carved, covered with gold, inlaid with turquoise, decorated with feather work and exhibiting the remarkable degree of skill attained by an industrious and intelligent race, seems, indeed, to be a fitting epitome of the strange civilization of Ancient Mexico, the real barbarism of which was mitigated by the most marvellous perfection in every detail of industrial art. [Nuttall, 1891, p. 1.]

In describing the Eskimoan throwing-stick from Alaska, Mason (1885) differentiates some 13 types; each is characteristic of a particular region. These types differ from each other only slightly in placement of handle, thumbgroove, fingergroove, and pegs, cavities for finger tips, shaftgroove, and hook for the harpoon or projectile shaft.

He is of the opinion that the use of the throwing-stick by the Eskimo was dictated by necessity and that this device has been subject to considerable development as revealed by specimens in the National Museum. On this point Mason says:

> The Eskimo spend much time in their skin kyaks, from which it would be difficult to launch an arrow from a bow, or a harpoon from the unsteady, cold, and greasy hand. This device of the throwing-stick, therefore, is the substitute for the bow or the sling, to be used in the kyak, by a people who cannot procure the proper materials for a heavier lance-shaft, or at least whose environment is prejudicial to the use of such a weapon. . . .
>
> It is more than probable that further investigation will destroy some of the types herein enumerated or merge two or more of them into one; but it will not destroy the fact that in changing from one environment to another the hyperboreans were driven to modify their throwing-stick.
>
> A still more interesting inquiry is that concerning the origin of the implement. It is hardly to be supposed that the simplest type, that of Anderson River, was invented at once in its present form, for the Australian form is ruder still, having neither hole for the index finger nor groove for the weapon shaft. [Mason, 1885, pp. 279, 288.]

Murdoch describes the use of the "throwing-board" by the Point Barrow Eskimo as follows:

> Both of the kinds of darts above described are thrown by means of a hand board or throwing-board. This is a flat, narrow board, from 15 to 18 inches long, with a handle at one end and a groove along the upper surface in which the spear lies with the butt resting against a catch at the other end. The dart is propelled by a

> quick motion of the wrist, as in casting with a fly-rod, which swings up the tip of the board and launches the dart forward. This contrivance, which practically makes of the hand a lever 18 inches long, enables the thrower by a slight motion of the wrist to impart great velocity to the dart. The use of this implement is universal among the Eskimo, though not peculiar to them. The Greenlanders, however, not only use it for the two kinds of darts already mentioned, but have adapted it to the large harpoon. [Murdoch, 1892, p. 217.]

Nelson describes the "throwing stick" as used by the Eskimo about Bering Straits as a very efficient instrument in the taking of waterfowl.

> The Eskimo are very expert in casting spears with the throwing stick. The small, light spears used in hunting seals are cast from 30 to 50 yards with considerable accuracy and force. I have seen them practice by the hour throwing their spears at young waterfowl, and their accuracy is remarkable. The birds sometimes would see the spear coming and dive just before it reached them, but almost invariably the weapon struck in the middle of the circle on the water where the bird had gone down. Bird spears are generally cast overhand, so as to strike from above, but if the birds are shy and dive quickly, the spears are cast with an underhand throw so that they skim along the surface of the water. I have seen a hunter throwing a spear at waterfowl on the surface of a stream when small waves were running; the spear would tip the crests of the waves, sending up little jets of spray, and yet continue its course for 20 or 25 yards. This method is very confusing to the birds, as they are frequently struck by the spear before they seem to be aware of its approach. [Nelson, 1896, p. 152.]

The antiquity of the atlatl in the southwestern United States seems demonstrated by Harrington in the exploration of Gypsum Cave, Nevada. While he actually found no atlatls, he did find many projectile shafts, "foreshafts" and "butts" of wood and cane, and chipped-stone points which he designated atlatl dart-points. From their size and manner of construction, these shafts could not have been shafts for arrows, but could have served admirably as projectiles cast by atlatls. The shafts he classified in two groups. Specimens of the older form he found definitely under undisturbed layers of the dung of sloth. The later form of shaft he identified as "Basket Maker II." Of these types of projectile shafts he says:

> With respect to the age of the two types, we reiterate that we regard the first as the older, for this reason: We found specimens of the first type below a layer containing sloth dung and sloth hair. The second type we regard as later because we found specimens of it above the same sloth-layer in the same place—Room 2. . . .
>
> We claim the first type to be contemporary with the sloth on account of the find just referred to; we call the second type "Basketmaker" because of its close similarity to Basketmaker darts found elsewhere, and because the presence of Basketmakers in Gypsum Cave is indicated by other typical specimens. [Harrington, 1933, p. 114.]

Even though no atlatls were found in Gypsum Cave, it appears that their use at that site is clearly demonstrated, both prior to and after the occupancy of this cave by the sloth. This would point to a considerable antiquity for this implement in the Southwest.

Harrington (1933) agrees with most writers that the atlatl is a very old and primitive device, which has had a long period of development in many widely separated areas, and at one time or another has found use over the whole of the Americas. However, the bow was so superior to it that the atlatl was usually rapidly superceded by the bow in any particular region where the bow became known.

This would imply that in the pre-Columbian times the atlatl probably had become nonexistent in many areas in America where it had once been largely used as a very important means of procuring food.

Of the development and distribution of the atlatl, Harrington says:

> Of all the artifacts, . . . the most abundant were the fragments of darts used with the atlatl or spear-thrower, shattered splinters of these of various sizes being found in all parts of the cave, especially in the vicinity of the entrances leading from Room 2 into Room 3. Evidently something had taken place in this part of the cave to account for the expenditure of so much ammunition. . . .
>
> The atlatl (an Aztec work) is also known as the throwing-stick, spear-thrower, dart-thrower, or spear-sling; it consists (in the Southwest) of a stick about 20 inches long with a handle at one end and a spur or crotchet in the other. This spur engages a little pit or cup drilled in the butt of the dart (or javelin) for the purposes. In use the atlatl and dart are held in the right hand, with the butt of the dart against the spur; then the dart is cast with a sweeping overhand motion. The object of the whole device is to lengthen the user's arm by the length of the atlatl—20 inches—and consequently to give more leverage, greater force, in casting the dart. . . .
>
> The darts used with these atlatls were usually 4 or 5 feet long, feathered like an arrow and were usually provided, in the Southwest at least, with a stone point.
>
> It is thought that the atlatl, called *propulseur* by French archeologists, first appeared in Europe in late Paleolithic times, because in the Magdalenian deposits of that period many specimens have been found carved in ivory and antler, showing a high development. It is reasonable to suppose that, as a wooden implement, the atlatl may have appeared in the Solutrean stage preceding the Magdalenian. In all events we know that in Europe it was characteristic of a late Pleistocene, archeologically a late Paleolithic, culture, associated with an Upper Pleistocene fauna, many species of which are now extinct, and was in vogue at the time of the closing phases of the last glaciation.
>
> Today the atlatl is found among the aborigines of Australia, in Melanesia and Micronesia, and in Siberia, in the Old World. In the Americas it probably covered all the northern continent at one time, extending down through Central America into South America as far as Peru and Chile. However, at the time of the arrival of Europeans the bow and arrow had supplanted the more archaic weapon in most localities, but it was still retained by the Aztec and other peoples of central and southern Mexico, and by the Eskimo and some of their neighbors in the far north, straight across the northern fringe of the continent to Labrador, and even in Greenland.
>
> Over all the intervening sections between this northern strip and central Mexico it had died out completely, although there is some evidence that it may have been used during the period of colonization by the Indians of the Channel Islands off the coast of Southern California. In this last instance, however, there is a possibility of its having been reintroduced by Aleut sea-otter hunters from Alaska brought down to the Channel Islands by Russian fur-traders.

> Until very recently the Eskimo employed the atlatl for hunting wild fowl, and, strangely enough, it has also been used lately by the Tarascans for the same purpose on Lake Patzucaro, Michoacan, Mexico. Recent use is also reported from northern South America. [Harrington, 1933, pp. 89–92.]

It is interesting to note this opinion of Harrington's that the use of the atlatl at one time probably covered all of North America.

During the past two decades, much evidence has been discovered which points to the use of the atlatl in the Southwest, particularly Arizona, New Mexico, and Texas.

In discussing the Basket Maker culture from the caves of Arizona, Kidder and Guernsey report one nearly perfect and several broken specimens of atlatls taken from cave 1, Kinboko, Ariz., found during their excavations in 1915. Of this perfect specimen they say:

> It consists of a long, thin stick with a grip for the hand at the end, and a hook-like spur to hold the butt of the spear at the other. . . . Its length over all is 26 inches; width of spur end 1⅜ inches; of grip end ⅞ inch. . . . The spur is a little rounded projection carved in the end of a groove sunk into the upper or flat side of the shaft. The last two or three inches of the spear fitted into this groove and a little shallow cup in its butt ingaged the spur. . . . The groove, together with the cup and spur arrangement, must have held the dart perfectly steady, yet without in the least hampering its release at the instant of throwing; there could have been no possibility of side-slip. [Kidder and Guernsey, 1919, pp. 178–179.]

With this specimen was found a white, polished, and perforated limestone object and with it certain evidence that it was attached by wrappings to the underside of the atlatl. The finding of somewhat similar stone objects on other sites led the authors to suspect that they also were weights to attach to spear-throwers and that the weighting of these weapons was perhaps a general custom. On this point they say:

> For what reason these stones were attached to the back sides of atlatl shafts is not obvious; they may have served as weights to give a proper balance or to lend added power to the apparatus. The peculiar shape of Cave 1 specimen and the very fine finish of all three, make it seem possible, however, that they may have had other than utilitarian purpose. That the practice of binding a stone to the back of the atlatl was a common, if not universal, one among the Basket Makers, is shown by an example from Grand Gulch in the Field Museum, Chicago, which bears a small, beautifully worked piece of limestone. [Kidder and Guernsey, 1919.]

The darts used with these atlatls were made of a main shaft, and a foreshaft described as follows:

> The main shafts are of some light but strong wood with a small pith "heart." The butt of each is provided with a shallow cup to engage the spur of the throwing stick, . . . and the ends are wrapped with a fine sinew seizing to keep the spur from shoving too far into the cup and thus splitting the shaft. . . . As to foreshafts we have more data, four specimens having been taken from the debris in Cave 1. . . . It will be noted that, although they differ somewhat in length (longest 6¾ inches, shortest 4⅜ inches), they are all made in the same

> way. Each has the butt tapered to fit the socket of the main shaft, the taper being sometimes roughed a little to provide a grip. The tips are deeply notched to receive the stone points, which were made fast with seizings and gum. [Kidder and Guernsey, 1919.]

Guernsey and Kidder continued their excavations in northeastern Arizona in 1916, and in describing their finds in the Basket Maker caves they report a number of very fine specimens of atlatls and shafts. Of these they say:

> Atlatl or Spear-thrower. The atlatl is a device which serves to add greater length and, therefore, greater propulsive force to the arm of the thrower in launching a spear or dart. It consists of a long, thin, stick with a grip for the hand at one end, and a hook-like spur to engage the butt of the spear at the other. In throwing, the butt of the spear was placed against the spur at the end of the atlatl; its shaft lay flat along the atlatl with its point projecting in front of the user's hand; it was held in this position, probably near its middle, by the second (fore) and third fingers which passed through the loops of the atlatl on the sides of the grip below the loops, holding it firmly against the palm and heel of the hand. The base of the thumb served to solidify this grip on the atlatl, and the thumb proper aided to steady the spear in its resting place between and upon the second and third fingers.
>
> The atlatls illustrated in the plate were all found with burials in White Dog Cave. The finest of these, Plate 33, *b*, *c*, had been broken nearly in two before it was placed in the cist. It is made of oak, carefully worked down and almost polished. The length over all is 25 inches. The front, or spur side, is nearly flat, except for the short distance between the spur and the distal end, where the middle is a little higher than the rest of the surface. The sides are rounded and the back is slightly convex. The distal end terminates in a blunt point. The spur is set at the head of a short deep groove, the bottom and sides of which show plainly the marks of the sharp stone tool used in excavating it. At 3½ inches from the rounded proximal, or hand end, the two sides of the stick have broad notches; these notches lie between the finger-loops. The latter are made of a single strip of heavy dressed hide folded lengthwise. . . . Tightly lashed to the back of the atlatl, as shown in the drawing, are three beautifully worked greenish stones of elongated loaf-shape, flat where they lie against the wood, their upper sides sharply convex. All three are fashioned from a substance identified by Professor J. B. Woodworth as a fossilized mammalian tooth. The entire shaft, from the binding which holds the upper stone to the finger-loop attachments, is coated with a thin layer of resinous gum, applied before the stones were tied on, but afterwards renewed on the front side, where it covers the seizing of the middle one. [Guernsey and Kidder, 1921, p. 80.]

Of the projectiles they say:

> Darts. The darts cast with the aid of the atlatl consisted normally of two parts; a long main shaft, feathered at the proximal or butt end; and a short foreshaft set into the tip or distal end of the main-shaft. Heretofore, there has been little accurate knowledge as to the mainshafts, the material recovered having been fragmentary. The expedition of 1916, however, yielded three nearly perfect specimens, as well as a number of less complete ones, from which additional details can be learned. These were all found with burials, and had, on account of their length, been broken before being placed in the cists.
>
> The three entire shafts referred to above were in halves when discovered; mended, they measure, exclusive of foreshafts, 52½, 55, and 55½ inches long.

> The tips or distal ends are the heaviest parts, averaging one-half inch in thickness; from this maximum diameter there is a gradual taper to the butts or proximal ends, which average ⅜ of an inch through. They are made of straight, slender branches of some light wood with a small pithy heart; the bark has been carefully removed, the twigs trimmed close, and in some cases the knots have been further eliminated by rubbing. The large ends of some shafts have a very slight terminal taper (plate 34, h), and the edges of the butts rounded.
>
> . . . In the distal or large end of the shaft is drilled a cone-shaped hole 5/16 of an inch in diameter at the mouth and one inch to 1¼ inches in depth; into this socket was fitted the butt of the foreshaft as in *j*. In order to prevent the socket from being split open when the foreshaft was driven back into it on impact, it is reenforced by outer ferrule-like wrappings of stout flat sinew as shown in the drawing. The proximal or butt end of the main-shaft is provided with a shallow cup, *b*, to engage the spur of the throwing stick, and here again there is sometimes applied a band of sinew to prevent splitting. [Guernsey and Kidder, 1921.]

As the result of excavation in 1920, Guernsey (1931, p. 71) reports an unusually fine specimen of atlatl from cist 1 of Broken Roof Cave in northeastern Arizona. This specimen he identifies as of Basket Maker II culture. It was 21 inches long, was made of oak, and carried the usual finger loops of leather and an ellipsoidal loaf-shaped stone, weighing 2 ounces, attached by sinew lashings.

In Arizona, there has been found abundant evidence of the use of the atlatl in the earlier cultures; its discontinuance among the later ethnic groups there has been noted.

Roberts describes the transition from the atlatl to the bow in the Southwest, as demonstrated at the Ruins of Kiatuthlanna, as follows:

> No spear points were found in the pueblo. This is consistent with the tendency of the period, Pueblo III, throughout the Southwest. As the pueblo cultures progressed there seems to have been a decrease in the use of spear points and a corresponding increase in that of arrowheads. It will be recalled that the early and classic period Basket Makers, I and II, had only the spear and spear thrower and that the bow and arrow apparently did not make its appearance until late in Basket Maker III. The latter ultimately replaced the other weapon entirely. Hence, in later pueblo periods spear points were not so extensively used. There is no evidence thus far to show it, but it is possible that the spear of later periods was of the thrusting rather than the hurling type. Certainly the spear thrower or atlatl did not survive for any length of time, if at all, in the Pueblo era. [Roberts, 1931, p. 158.]

Roberts also notes that, in New Mexico in Basket Maker II, the atlatl was superseded by the bow and arrow. He says:

> It seems rather certain that, at the time Shabik'eshchee village was occupied the bow and arrow had gained a foothold and were definitely replacing the short spear and atlatl, the chief weapons thus far known from the Basket Maker II period. Until quite recently it was thought that the bow and arrow were unknown in Basket Maker III times because in some of the earlier sites belonging to this cultural stage there were no indications of the weapon. [Roberts, 1929, p. 139.]

The last 10 years have produced considerable evidence of the use of the atlatl by the prehistoric peoples of Texas. In the rock shelters in Val Verde County, Tex., Pearce (1933, p. 121) reports finding sticks of wood with tenonlike ends and some with notched ends. These he identifies as atlatl foreshafts. They are similar to finds by Setzler (1932) in Brewster County, Tex. He also reports foreshafts of wood with the distal end sharpened, to be used without any projectile point.

In describing spear shafts recovered from some caves about 20 miles northeast of El Paso, Tex., in 1927 and now in the United States National Museum, Roberts says:

> The spear shafts are very interesting. . . . They were made from the flower stalks of the agave, which, although light, is very strong and suitable for such purposes. Their average length varies between 5 ft. 3 in. and 4 ft. 9 in. The distal ends of these shafts are the heaviest. They have an average diameter of one-half inch and taper gradually towards the butt ends. The latter average a little less than a quarter of an inch in diameter. In the heavy ends a coneshaped hole was drilled for the purpose of inserting a short foreshaft in which a stone point had been mounted. They were not always equipped with stone points, however, as some of the specimens in the collection of Mr. Stafford had hard, sharp, wooden, points. In every case the proximal or butt end shows a slight cupshaped depression, which suggests that the shafts were for use with a spear-thrower or atlatl. The latter object has a small hook at one end which would fit into such a cup-like hole and aid materially in hurling the projectile. [Roberts, 1929 a, p. 9.]

Here is a definite suggestion of the use of wooden points instead of flint. This is particularly interesting in view of the fact that it is believed that this type of foreshaft may have been used by the Shell Mound dwellers of Alabama.

It is further interesting to find that from Texas has come the suggestion that the use of the atlatl antedated the use of pottery. Coffin reports the use of the atlatl in Bee Cave Canyon, Tex., as contemporary with the bow in a prepottery complex. Of his finds in this rock shelter he says:

> Although many fragments of notched arrow shafts were found, there was no trace of a bow. The occurrence of the atlatl and the notched arrow, in deposits indicating no great range of time, would seem to suggest that the throwing-stick and the bow had been used contemporaneously.
>
> A notable feature is the scarcity of pottery, the only trace of it being some unbaked figurines, and three small fragments of vessels, one of which (part of a bowl) is of thin brown ware with black painted decoration. These potsherds were found on, or near, the surface and are doubtless intrusive. [Coffin, 1932, p. 61.]

Recently Patterson (1937, p. 64) had called attention to the use of "boatstones' and similarily shaped stones as attachments to atlatls. The purpose of such stones is conjectural. It is not certainly known whether they should be regarded as charms and fetishes, or as "balancing weights" as aids in throwing. However, his study leads to the suggestion that the area of distribution of "boatstones" and stones similarily shaped might be coincident with the area where the atlatl was in use. Since a few boatstones have been found in these shell mounds, this suggestion is especially interesting in connection with the problem of the use of the atlatl by Shell Mound dwellers in Alabama.

In 1933, Martin reported evidence of the use of atlatls in the Shumla Caves of Val Verde County, Tex. This evidence consisted of projectile points, foreshafts with stone points attached, nocked ends of projectile shafts, proximal ends of atlatls showing notched wooden handles, and distal ends of atlatls with wooden sear or spur and longitudinal groove. With this mass of information he reports also one antler atlatl hook which he describes as:

> A detachable device which would convert any stick of appropriate size and shape into an atlatl. . . . this specimen is 2⅛ inches in length and ½ inch wide. It is either bone or deer antler—probably the latter. It is pierced to permit attachment to the shaft of the atlatl and is grooved at a slightly downward angle along its sides to protect the lashings from contact with javelin or arrow. This specimen could also have been used with flare-nocked arrow or cup-nocked javelin. [Martin, 1933, p. 29.]

It is important to note that in Texas, where conditions for the preservation of wood were good, wooden atlatls have been found in association with an antler hook which was regarded as the "detachable" distal end of an atlatl.

Because the atlatl is known to antedate the use of the bow and arrow over so much of the southwestern United States, the opinion has grown that at some time the use of the atlatl may indeed have been widespread over the whole of North America, as Harrington has suggested.

There has been, until recently, very little evidence from the southeastern United States to support such a generalization. However, it now appears that the prehistory of several regions in the Southeast is to be explained on that basis. Evidence on this point has been slow in accumulating. Probably the reason is that most atlatls were made of wood, which like their successor, the bow, would, through desiccation, soon disappear on most sites. So far, evidence for the existence of atlatls in the southeastern United States has been limited to the finding of carved bone or horn implements which could serve as the distal ends of spear throwers. These implements usually have a conical hole drilled longitudinally in the horn for attachment to the handle of the spear thrower; they always have a notchlike hook presenting a "spur" for holding the end of the projectile shaft.

In the light of present knowledge, it can hardly be doubted that some of the "antler hooks" figured by Moore (1916, fig. 13), from Indian Knoll, on Green River, Ky. (as for example, A, B, C, and O, fig. 13), are in fact the horn ends of composite atlatls.

In the excavation of site Lu° 86, in the Wheeler Basin (Webb, 1938), Lauderdale County, Ala., in 1934, one such horn implement was found. In the report on that site, attention was called to the similarity of this artifact to two others reported in 1928 by Fowke (1928, pl. 73, *a*, *b*) from the Town Creek Mound, Colbert County, Ala.

In this connection it is interesting to note that Claflin (1931, pp. 33–34) shows in *a*, plate 41, a bone or horn object taken from the Stalling's Island Mound, which appears to be the end of an atlatl. He does not so designate it, but, from consideration of the size and number of the chipped-stone points recovered, he is led to suggest the use of the atlatl. It is of interest to note his belief that arrow points were generally small and that all large and crude points probably suggest the use of the spear-thrower. He says:

> Scattered throughout the entire excavated area chipped implements occurred in large quantities, over 5,000 such objects comprising the final collections. The large numbers of chipped artifacts are in striking contrast to the dearth of rubbed stone material. It is difficult to visualize to what use such great numbers of chipped implements were put in the daily life of the Stalling's Island people. Only a very few points were small enough to justify their use as arrowheads, many too crude fashioned to be of any service whatsoever as the point of a weapon with the possible exception of being attached to a long arrow for shooting fish. Possibly the atlatl was in extensive use and many of the points 1¾ inches to 3 inches in length were attached to atlatl darts. Every stage of manufacture is represented in the collection and the fact that these articles were made in quantities on the mound is evidenced by thousands of chippings. Slate was the commonest material used, three objects of slate being found to one of any other material. As a whole, the chipping can be characterized as crude, although naturally there are exceptions where great care in finishing was exercised. Comparatively few chipped implements were found with burials, not more than 30 being mortuary offerings. [Claflin, 1931, pp. 33–34.]

The supposition that all arrow points were small—less than about 1½ inches in length—and that crude, heavy, large points suggest their use as atlatl darts seems to be fairly well established as a fact in the Southwest, so far as evidence on that point is available.

It is of interest also to note that one of the types of stone points—"atlatl dart points" found in Gypsum Cave—are very numerous on the Stalling's Island site in Georgia. Peabody (1904, pl. 20) figures a bone or horn hook from a mound in Coahoma County, Miss. Though details of its associations are not given, it can hardly be doubted that it was the hook-end of an atlatl. It is obvious that it was fashioned for attachment to a handle at its proximal end.

Recently there has come to light a suggestion that the atlatl was used in the southeastern United States down to the historic period. Dr. Swanton[2] reports a recent discovery of a reference, in Garcilaso de la Vega's narrative of the De Soto expedition, to the use of an atlatl by an Indian at the mouth of the Mississippi. The weapon, as described, was about 22 inches long. According to Dr. Swanton, the Indian was probably related to the Chitimacha.

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[2] Swanton, Dr. John R., Bureau of American Ethnology, personal communication, Oct. 17, 1936.

The excavation of shell mounds in Pickwick Basin has yielded a sufficient number of bone and antler hooks, in such a variety of forms that it would seem that the use of the atlatl by the builders of these shell mounds is reasonably substantiated. It is to be expected that the development of the throwing stick in the southeastern United States would follow more or less closely that of the other areas of North America about which more definite information seems available. In all areas where the atlatl is known to have been abundant, the construction was mostly from wood. In the main, the throwing stick was made of a narrow, flat board varying from 15 to 23 inches in length. At one end there were handles, finger loops, finger grooves, finger holes, or pegs, as aids in holding it and in maintaining the placement of the projectile shaft upon it. At the other end, some form of hook, rising above the plane of the throwing stick, would engage the end of the projectile shaft and thus assist in propelling it forward by the quick "throwing motion" of the hand and arm. This hook for engaging the projectile shaft is thus an indispensable part of the throwing stick, and its functioning is the essential element in the entire operation of casting the projectile. It is known that in wooden throwing sticks the hook was carved out as an integral part of the weapon when the flat board itself was made. Such implements, if left in shell mounds, as has been pointed out, would soon decay and leave no trace of their existence. It is believed this happened in the early stages of the shell mounds of Pickwick Basin. As in Mexico and elsewhere, the "throwing stick" underwent gradual development; so in this region it is believed that modification of a complete wooden throwing stick led to the substitution of a bone or antler hook in place of the original wooden hook portion. The main body of the flat board, perhaps 18 inches long, remained of wood, but the bone or antler hook was designed for attachment to it. While such a separate hook might take many forms, it would have to meet in all cases, two major requirements: 1, It would have to be made so that it could be easily and securely attached to the wooden portion of the throwing board; and 2, it would have to be so constructed as to engage efficiently the end of the projectile shaft in the act of throwing. Beyond meeting these two conditions, it might be constructed in a variety of forms and from various materials. This seems to be exactly what has happened in the shell mounds of northern Alabama.

The number of atlatls thus made with such special hooks not integral parts of the weapon, would probably be in small proportion to the total number in use, and one would, therefore, not expect to find bone and antler hooks extremely numerous. Certainly, their number would not be in any way comparable to the number of stone or bone projectile points found in the same sites. It appears that in every shell mound where extensive excavations were made bone or antler hooks were present, and all the various types meet the necessary requirements for use as atlatls. The actual number of antler hooks at any site is not large, and the number found is roughly proportional to the extent of the excavations. Further, the people of each site seem to have preferred one particular form of atlatl so that each site has its own major type form.

Plate 306, figure 1, presents eight types of these bone and horn hooks. Counting from the left, Nos. 1, 3, and 4 are from site Ct° 27, Nos. 2, 5, and 7 are from site Lu° 67, and Nos. 6 and 8 are from site Lu° 59. No. 5 is the type from site Lu° 67. These hooks are made from deer antler. The horn shaft, about 4 inches long, was cut squarely off and drilled longitudinally for about 2 inches. The hole is slightly conical, and the diameter at the outer end is, in every case, about as large as the width of a horn will permit. When thrust upon a wooden shaft cut to exactly fit the hole, a very secure and substantial union of shaft and hook could be made.

Attention has been called to the manner in which the end of the antler has been worked into a knoblike hook, page 125. The cylindrical horn shaft is made flat on one side for its entire length up to this hook. The hook projects just above this flattened side. On this hook there has been carved a small spherical protuberance. In every specimen of this type these features are identical. It seems that this protuberance, as shown in form 5 (reading from left), plate 306, figure 1, was a very desirable feature in the construction of hooks, and one naturally seeks a reason for its general use. A reasonable answer is not difficult to find. In the region of the shell mounds on the banks of the Tennessee River, cane grew in abundance, and even today cane poles in diameter suitable for large or small projectile shafts are still abundant. Here, shell-mound peoples could easily have found an adequate supply of cane shafts for projectiles. Such shafts are hollow, and when cut present an open end which could have engaged the knoblike protuberance on the horn hook and easily held the shaft in position while being thrown from an atlatl. Even if solid shafts were used, as in the Southwest, the butt of the shaft could have been made concave so that it would engage the knob on the atlatl hook.

Forms 2 and 7 are different types of hooks also made of horn. Here, the well-developed point takes the place of the knob on the hook. In forms 1, 2, and 3, as shown in plate 306, figure 1, a small stick has been thrust into the specimen to show the alinement of the hole drilled for the shaft. In form 2 it is interesting to note that the hole is "off center," and not parallel to the axis of the section of horn.

This has the effect of elevating the point above the shaft and making a more efficient hook.

At site Lu° 59 the dominant type is represented by No. 6. This is made of a section of antler about 6 inches long. The larger end is drilled to receive a shaft, but the side contiguous to the hook, after being made flat, has a large longitudinal groove cut centrally along this face. The hook end is worked into a truncated cone with a knoblike protuberance projecting centrally just above the end of the longitudinal groove. If again we may conceive this protuberance to be useful in engaging the end of a projectile shaft, the longitudinal groove would serve the additional purpose of steadying the shaft when thrown. Type 8, also from site Lu° 59, shows how closely the diameter of the drilled hole in the base approximates the diameter of the horn section.

At site Ct° 27 the type form is represented by No. 1, made of bone, and No. 3, of horn. It may be said that a section of bone or horn cylinder was drilled longitudinally, but also eccentrically, to receive a shaft. The section was cut off squarely, and on this face—always opposite to the drilled hole and as far removed from it as possible—a small knoblike protuberance was cut. These were carefully worked and are well shown in the specimen photographed. The sticks, which have been thrust into the holes opposite these small protuberances in forms 1 and 3, show how eccentrically the shaft fits. Evidently, the intention was to raise these small knobs above the level, or plane, of the shaft of the throwing stick.

Type 4 may also be a hook for a throwing stick. It is made of bone and is rather crudely worked with no special means of attachment to the shaft. The specimen photographed is the only one of that type found.

If one accepts the hypothesis that from these shell mounds these hooks represent the remains of the more elaborate, composite, throwing sticks, it would be natural to suppose that the simpler, and probably more numerous, atlatls were made entirely of wood and have all been lost by decay. In the investigation of such an hypothesis, one is prepared to expect evidence of many projectile points used with both of these types of throwing sticks.

In discussing the "generalized profiles" of the shell mounds in Pickwick Basin, evidence has been presented to show that many of the cultural changes observed are often more readily explained upon the basis of the cultural development of a single ethnic group than on the assumption of an abrupt shift of population due to migration or invasion.

In most sites the evidence is such as to suggest that the atlatl was used from first to last throughout the history of these deep shell middens. If the bow was ever in use here, it was limited to a very late phase of the middens. It was probably associated with the shell-tempered pottery people who buried their dead extended in very superficial graves and who used small triangular arrow points. This was a transient and relatively unimportant phase of these sites. The evidence thus points to the continuous use of the atlatl by these groups from a time so remote that bone artifacts were dominant over flint. This use continued through a period of development of flint, which definitely antedated the pottery, to a time when pottery was acquired. Even after the acquisition of pottery, the use of the atlatl was not discontinued. Only in a few of the middens is there evidence of the use of flint projectile points so small as to indicate with certainty the use of the bow. In every case when arrow points are found, they are in the very latest cultural levels of these middens. It is to be expected that parallel to this cultural development, and in part because of it, the atlatl would also undergo improvement, which it seems to have done. In the zones where the horn and bone hooks are found flint projectile points are abundant, and they probably were thrown by atlatls. However, prior to the general use of flint, there are early zones in which a certain type of bone projectile point is dominant. It is believed that this is the kind of point first used in the early atlatls at these sites. These bone points are found in all shell mounds in northern Alabama and in some levels are very numerous. They are shown in plate 148, figure 2, site Lu° 59; plate 287, figure 1, site Ct° 27; and plate 226, figure 1, site Lu° 67.

About the time the excavations of shell mounds began in Pickwick Basin, Dr. E. E. Tyzzer (1936, p. 261), of Harvard University Medical School, published a paper on bone projectile points from shell mounds along the North Atlantic seaboard. So instructive was the contribution that the opinion of Dr. Tyzzer was sought concerning the possibility that the Alabama type of bone points may have been projectiles thrown by atlatls. Sample specimens were submitted to him and he replied, "I find nothing about the bone points submitted that is inconsistent with your view that they were made for darts to be thrown by atlatls." Dr. Tyzzer made a brief study of seven specimens submitted to him. His notes in describing these specimens and comparing them with points from the shell mounds of Maine are so illuminating that they are quoted in full.

NOTES ON SEVEN SPECIMENS OF BONE POINTS FROM ALABAMA SHELL DEPOSITS

Shape.—All taper toward extremities, anteriorly more abruptly to a conoidal or broad conical point (F. S. #193), posteriorly more gradually to an unfinished extremity. The posterior taper may be either straight or curving. All, except F. S. 45, show a longitudinal groove on one surface, shallow in F. S. 51, well-marked in the other five. This represents the inner surface of the shaft of the long bone (i. e., the surface next the marrow) from which the points were made and is unworked other than the removal of spicules of cancellous bone. Apparently in order to make these points of the required thickness from the type of bone utilized, it was necessary to leave the groove. The bone points from Maine which are considerably lighter as compared with these, sometimes show grooves when the bones of smaller animals are utilized.

Symmetry.—All show antero-posterior asymmetry, the anterior portion being thicker, heavier and of different shape. The groove makes the flatter specimens bifacially asymmetrical. Others tend to be triangular in cross section. It is evident that the thickest portion or ridge of the long bone was commonly utilized in order to get as heavy a point as possible. This is well shown in F. S. #120 and #193 which are notably triangular.

SPECIMEN F. S. 110 WHICH IS RATHER FLAT SHOWS BILATERAL ASYMMETRY

Surface.—The unworked outer surface of the original bone goes to form one surface of many of the points, e. g., #51, 110, 119, 120, and 127. Otherwise the surface shows the longitudinal planing of an implement with a rough edge which has left coarse striae. The sharpening of the point in some specimens appears to have been a distinct operation following the process of shaping and it is quite possible that points such as #119 and #45 may have been resharpened.

Polish.—Only one of the seven points shows polish of the anterior extremity. In this, diagonal scratches show the effects of an abrasive. The finishing process in this case has served to round off the angles.

On five of the bone points, the tips are approximately in longitudinal axis, e. g., #119, 193, 127, 120, 110, in two, #45 and 51, it is off center.

Comparative differences of southeastern to Maine projectile points.—Heavier and with groove representing inner surface of long bone. General shape similar but show less intentional asymmetry. Not regularly subjected to a finishing process, polish. None of samples submitted show dulling although some may have been resharpened.

In this connection it may be added that these bone points from Alabama shell mounds are often found showing battering and abrasion as if damaged by striking a hard object. Some show attempts to resharpen them after damage.

It is to be noted that these bone points all have one heavy end, sloping steeply to a well-sharpened point. The other end gradually tapers to a crude unfinished dull point. The suggestion is offered that this unfinished part was set in the end of a hollow cane shaft to be thrown with an atlatl. Thus, set in a socket of proper size it would need no other attachment and when the shaft struck its target the point would be driven in, large end first. It would thus tend to remain in the wound, even after the shaft of the projectile fell off or was withdrawn. In any case, there seems but little doubt that these bone points were actually projectile points.

Finally, in the light of the foregoing, the following conclusions seem justified:

1. The atlatl was in use among the shell mound peoples of northern Alabama throughout almost all of their occupancies of these sites.
2. The atlatl was undoubtedly used by prepottery peoples although its use may have extended to the later pottery-making peoples.

3. The use of the atlatl seems to have antedated the use of flint projectile points on some sites, during which times bone and antler tips were used exclusively as projectile points.

4. On some sites the atlatl continued to be used after flint points partially or completely displaced bone and antler points.

5. The atlatl was displaced by the bow late in the history of some of the shell-mound sites. Such displacement seemed to follow the advent of the shell-tempered pottery people who used small triangular arrows.

Perhaps the discussion of the use of the atlatl should not be concluded without some consideration of an associated artifact—the so-called atlatl "weight."

As pointed out, Kidder and Guernsey (1919) reported atlatls from Arizona with polished stones attached. They suggest that these stones may have served as weights to give proper balance and to lend added power to the atlatl in throwing a projectile. This suggestion seems to be quite sound in view of later investigations and discoveries.

Reference has been made to the study of the "boatstone" distribution by Patterson, page 277, and to his suggestion that boatstones were attached to atlatls.

Moore (1916, p. 12) in his excavation at Indian Knoll probably found more atlatl hooks of antler than have ever been reported from any other single site. He was the first to notice and to comment upon the association in graves of these hooks with a type of polished "banner stone" which he called a "net spacer" or "sizer." So noticeable was this association that he tabulated the occurrence of 28 antler hooks, which he called "netting needles," and showed that in 26 instances these occurred in association with either a stone or an antler "net spacer." While this paired association in graves was recognized by Moore, the explanation of such association offered was that the hook was a needle used in weaving nets, and the associated stone or antler blocks were net spacers.

If one accepts the explanation that the antler hooks are actually the distal ends of spear throwers, he may be prepared to regard the accompanying artifacts as atlatl weights, serving a purpose similar to a boatstone or other polished stones known to have been attached to the throwing stick of the Southwest. This assumption has been greatly strengthened by the results of recent exploration on Green River, Ky. (Webb and Haag, 1939). In one site, "McLean 11," there were several instances of "atlatl hooks" found in juxtaposition to "atlatl weights," with their longitudinally drilled holes of the same size in the same line. This would seem to indicate that these artifacts were complementary parts of the wooden implement which connected them, and when this wooden connection or shaft decayed in the graves, the complimentary artifacts were left in association. These recent Kentucky finds leave little doubt that the atlatl constructed of wood actually often had at the distal end a hook of antler and on the same shaft a "weight" which, as suggested by Kidder and Guernsey, served to give proper balance and lend added power to the thrown projectile. Sometimes, as in the Southwest, this weight was a polished stone, previously described as a "net sinker." As suggested by Patterson, sometimes this weight was a type of "boatstone." As reported by Moore, cylinders of antler were used as weights. In the shell mounds of Alabama and Kentucky, the weight was most frequently a triangular prism of stone, with concave or flat sides and drilled longitudinally to receive the handle or shaft. It appears that occasionally this "banner stone" or "net spacer" was elaborated into a "winged" form. Finally, as pointed out in reporting on recent excavations on Green River, Ky., the weight was sometimes made as a composite of flat mussel-shell sections. Triangular disks of shell, from 7 to 15 in number, were drilled uniformly with a large hole, and while held together on the same shaft, were worked into a prismatic form resembling the stone weights.

If the foregoing conclusions prove to be correct, it may be possible to widen our knowledge of distributions and uses of the atlatl in areas where it had not previously been reported since such stone atlatl weights are well preserved in many types of sites where wood or even antler objects have long since disappeared. Such proven associations may thus be helpful to ascertain what is conjectured to be true, namely, that the atlatl once had wide use in the southeastern United States among early nonpottery groups.

Plate 306, figure 2, shows a number of forms of atlatl weights for comparison. Forms 1 and 2, reported from Arizona as actually used on atlatls there, are found detached in Kentucky. Form 3, the boatstone, is found sparingly in Alabama, also in Kentucky. Form 4, antler, and Form 5, stone, were reported abundant by Moore from Indian Knoll. Form 6 of shell has been found in Alabama and Kentucky. Form 7 has been found as an atlatl weight only in Kentucky. Forms 1, 2, and 3 were attached on the posterior side of the spear-thrower. The other forms were so drilled that they were slipped on the main shaft adjacent to the antler hook.

OCCURRENCE OF SPECIAL FORMS OF ARTIFACTS

The finding of several sites on the Tennessee River showing definite affiliation with the Moundville complex and the finding at Moundville and elsewhere of certain unusual but characteristic artifacts, such as circular stone disks, spatulate "ceremonial" axes, stone images in human form, monolithic hatchets, and copper pendants, have led to the desire to determine the extent of the distribution of these forms in the southeastern United States. The Southern States have produced many of these unusual forms, which in the past have been highly valued by collectors as objects of interest, quite aside from their historical or cultural connections. Many of these objects have thus been purchased, exchanged, and transported far from their original province, and often the record of their occurrence has been lost. It is obvious that generally the only data on distribution upon which reliable conclusions can be drawn is that to be found in archeological reports and in the records of museums where specimens have been well documented.

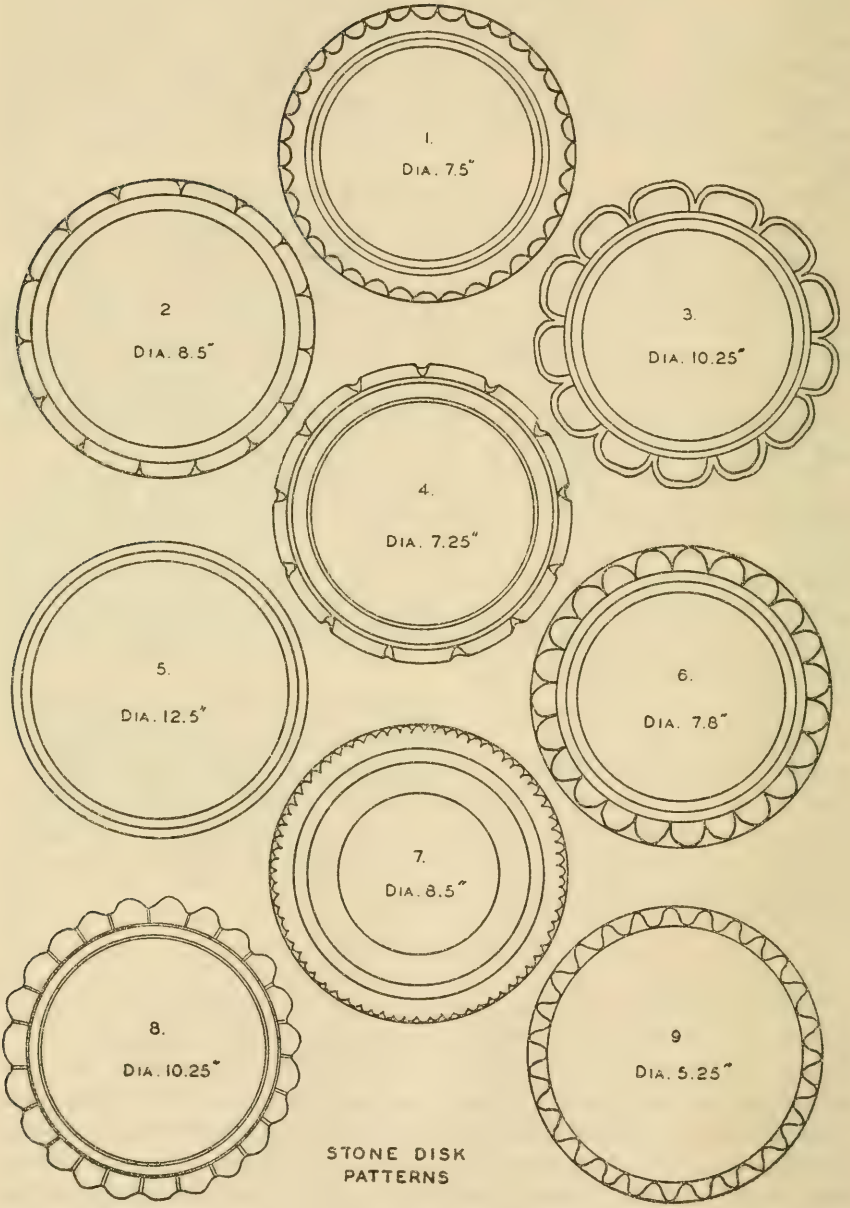
The assembling of information on the occurrence of these five types of artifacts required a search of the available literature and the working out of every reference bearing on the subject which could be found. This was accomplished by setting up a library research project, as a part of the work of the Central Archaeological Laboratory provided by the W P A at Birmingham, Ala. Under the supervision of Miss Julia C. Adcock of the Alabama Museum staff, these records were compiled from the literature. Forms of the artifacts were sketched, and maps showing distribution of occurrence were drawn

It is not possible, in such studies of occurrence, to state that every reference has been found, or every occurrence has been noted. However, it is possible to say in this case, that a diligent and careful search has revealed a body of data which, while it may be regarded as only a starting point in such studies, indicates the importance of these artifacts in the interpretation of archeological connections in the southeastern United States.

The occurrence of each type of artifact, as taken from publications, is shown in tabular form. These occurrences have been plotted on a map to show distribution. No attempt has been made to show how many artifacts of a kind have been found at any one place. In the case of stone disks, these artifacts have differed so much within the type that outline drawings have been provided to show the range of variations in size and form.

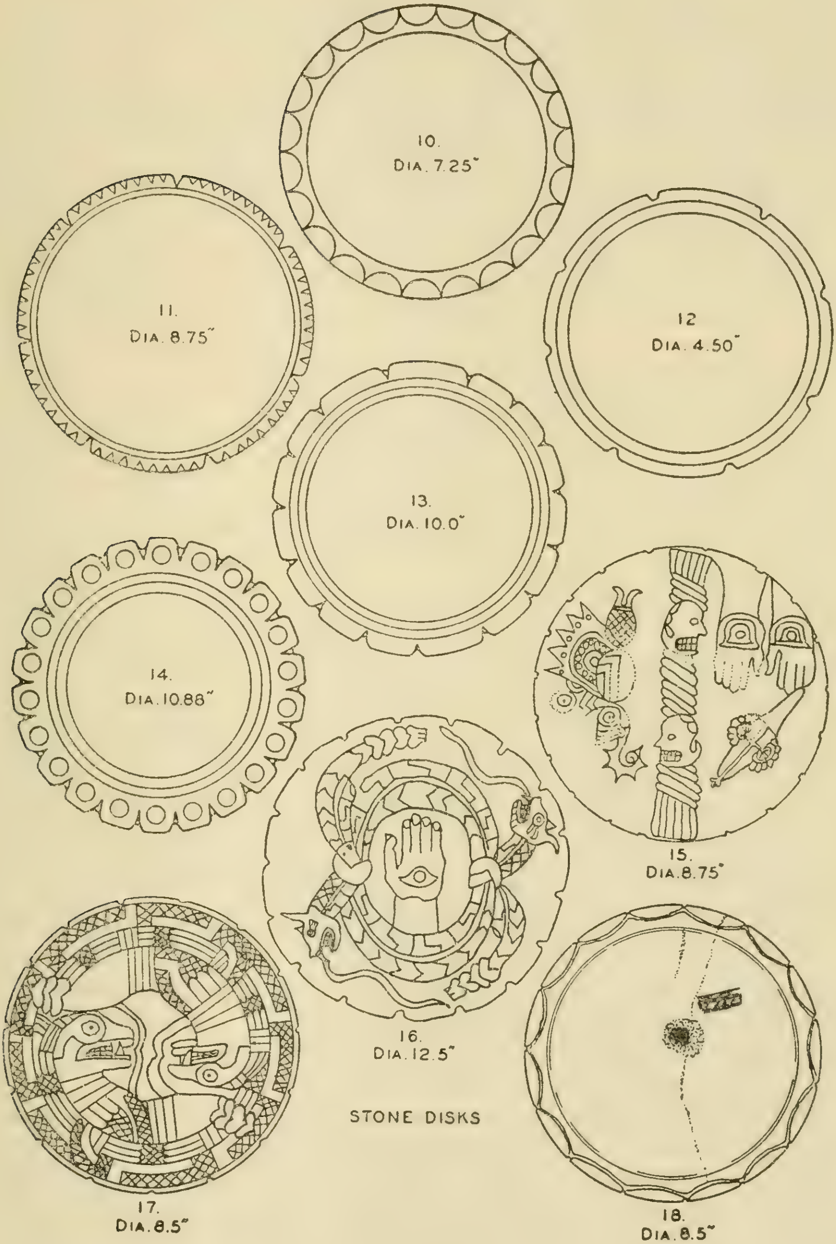
STONE DISKS

These circular stone disks, made of many materials, such as sandstone, shales, slates, fine grained gneiss, etc., vary in size from 12.5 inches to 4.5 inches in diameter. Nearly all are notched on the edges, and a few are elaborately engraved. Some are concave on one face as if used as palettes for grinding paint. Many have been found with lead or iron oxides smeared on them. Most of them have been found in graves. A few are drilled with a single hole for suspension. Many are decorated with one or more concentric incised circles. Such circles usually occur on the "reverse" side, that is, opposite to the engraving, if any, or opposite the notches, where the notches are not duplicated on both sides. Many are


1.
Dia. 7.5"
2
Dia. 8.5"
3.
Dia. 10.25"
4.
Dia. 7.25"
5.
Dia. 12.5"
6.
Dia. 7.8"
7.
Dia. 8.5"
8.
Dia. 10.25"
9
Dia. 5.25"

STONE DISK PATTERNS

Figure 92.


10.
DIA. 7.25"
11.
DIA. 8.75"
12
DIA. 4.50"
13.
DIA. 10.0"
14.
DIA. 10.88"
15.
DIA. 8.75"
16.
DIA. 12.5"
17.
DIA. 8.5"
18.
DIA. 8.5"

STONE DISKS

FIGURE 93.

found broken which may suggest intentional breaking in some cases. One case reported indicated fragments of a single disk were found in five different burials and the disk completely restored.

In table 36, 18 references to disks are reported from seven authors, besides those from excavations reported herein.

In order to show variation in form, disks have been drawn as shown in figures 92 and 93 to show engraving, notches, and circles. These disks have been drawn to the same size, but actual diameter of each is indicated in inches. The numbers attached to each disk refer to corresponding numbers in the table of occurrence, and this enables one to associate the form of the disk with its occurrence as far as is known. Drawing of disks numbering 9 to 14 inclusive are of disks found at Moundville and now at Alabama Museum of Natural History.

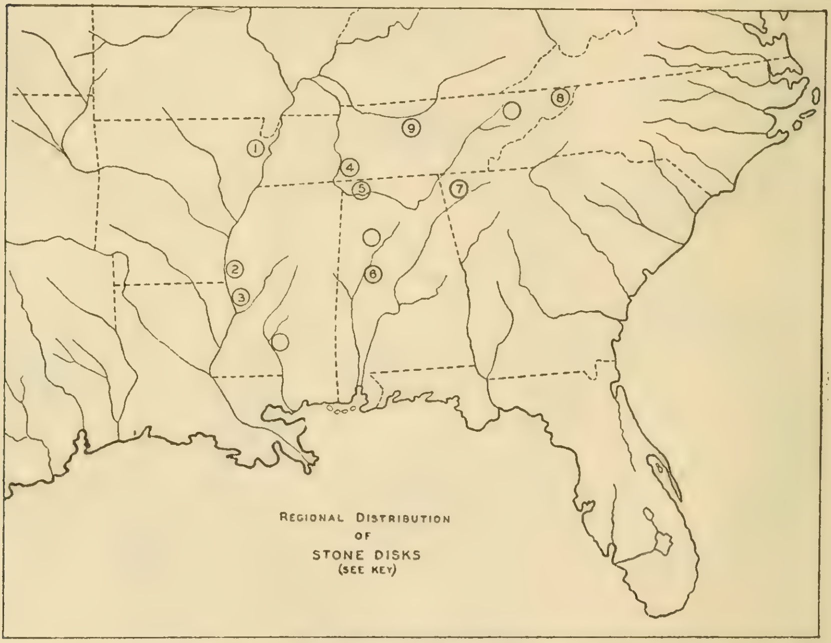


Figure 94.—1, Arkansas Post, Ark. 2, Lake Washington, Miss. 3, Issaquena Co., Miss. 4, Hardin Co., Tenn. 5, Florence, Lauderdale Co., Ala.; Koger's Island, Lauderdale Co., Ala. 6, Warrior River, Ala.; "Carthage" (Moundville), Ala. 7, Etowah, Ga. 8, Lick Creek, Tenn. 9, Near Nashville, Tenn.

To show graphically the occurrence of these disks, their sites have been plotted on a map of the southeastern United States (fig. 94). These sites have been numbered to correspond to the accompanying legend. Where occurrence at some sites is shown by blank circles without numbers, these artifacts are reported from the region indicated, but exact location is indefinite. In this map there are shown 12 sites on which disks have been found. Nine are known to have been described in reports. While no attempt has been made to determine the frequency of occurrence at any one site since such information is often not available in reports, yet it may be stated with confidence that the vicinity of Moundville, Ala., has yielded by far the greatest number of disks, as well as the largest, most carefully wrought, and most elaborately engraved ones. This would seem to suggest Moundville as a center from which these artifacts spread, although queerly enough it seems to be located on the edge of the area of their known occurrence.

It appears that, if Moundville were a center of distribution, they were not carried to the south and east, but that they were confined to the interior drainage basin and to sites reached from the Mississippi River and the Gulf. None are known to have been reported from the Florida and Atlantic seaboard.

TABLE 36.—*Occurrence of stone disk*

Author and reference [1]	Manner of occurrence and remarks	Location
Anderson (1875, p. 378)	From a mound. Disk similar to Moundville rattlesnake disk.	Near Lake Washington, Miss.
Brown, C. S. (1926, pp. 228, 229, figs. 182–183.) (17–18).[2]	In a mound	Issaquena County, Miss.
Holmes, W. H. (1880, p. 278; pl. 57, fig. 1).	From a mound	Near Warrior River, Ala.
Holmes, W. H. (1880, p. 278; pl. 66, fig. 6) (16).	From a mound (rattlesnake disk).	Near "Carthage," Ala.
Holmes, W. H. (1880, p. 278; pl. 57, fig. 2).	From a mound	Lick Creek, eastern Tennessee.
Jones, C. C., Jr. (1873, p. 373; pl. 22, fig. 6).	Plowed up on lower terrace of temple mound.	Etowah River on the plantation of C. L. Tumlin near Cartersville, Ga.
Moore, C. B. (1905, pp. 131, 136, pl. 15, fig. 4) (15).	"On level ground"	Moundville, Ala.
Moore, C. B. (1905, p. 145, pl. 3, fig. 19) (3).	2½ feet below surface	Mound C, Moundville, Ala.
Moore, C. B. (1905, p. 149, fig. 23–6) (6).	Near head of burial about 3 feet below surface.	Mound C, Moundville, Ala.
Moore, C. B. (1905, p. 175, fig. 65–8) (8).	With burial about 3 feet below surface.	Mound D, Moundville, Ala.
Moore, C. B. (1905, p. 178, fig. 66–4) (4)	Plowed up	Field north of mound D, Moundville, Ala.
Moore, C. B. (1905, p. 178, fig. 103–1) (1)	With burial	Mound H, Moundville, Ala.
Moore, C. B. (1905, p. 200, fig. 107–5) (5)	In mound 9 inches below surface and 9 inches above skull.	Mound O, Moundville, Ala.
Moore, C. B. (1905, p. 203, fig. 111–7) (7)	In grave with stone slab	Do.
Moore, C. B. (1905, p. 206, fig. 116–2) (2)	With burial about 39 inches from surface.	Do.
Moorehead, W. K. (1910, p. 452, fig. 393).	Plowed up on farm	Near Arkansas Post, Ark.
Thruston, G. P. (1890, vol. 1, p. 274, fig. 181).		Near Florence, Lauderdale County, Ala.
Thruston, G. P. (1890, vol. 1, p. 275)	"Old cemetery"	Near Nashville, Tenn.
Also	3 stone disks	Koger's Island, Tennessee River, Lauderdale County, Ala., site Lu^v 92.
	1 stone disk	Mound site near Tennessee River, Hardin County, Tenn., site Hn^o 4.

[1] For complete reference, see bibliography, p. 322.
[2] Numbers in parentheses refer to disks shown in figs. 92, 93.

THE SPATULATE FORM OF AX

This type of stone artifact has had many designations, all seemingly unsatisfactory. It has been called an ax, a problematical form, a "ceremonial" form, and in classification systems, it has been included along with other spatulate forms with which it seems to have no archeological significance. There can be no doubt that it was hafted, and that the hole sometimes found in such forms assisted in the attachment of the handle. They are often found showing stains on the stone of the decayed wooden handle. The general fact that they are never found chipped, or broken, but with perfect blades, although often made of soft and brittle stone such as limestone, schists, etc., has caused many writers to assume that this form was not an object of utility and could not have served as a cutting tool. Therefore, if it was hafted as an ax its use was "problematical," "ceremonial." Much has been written on this and other phases of this artifact which is here designated "the spatulate form of ax."

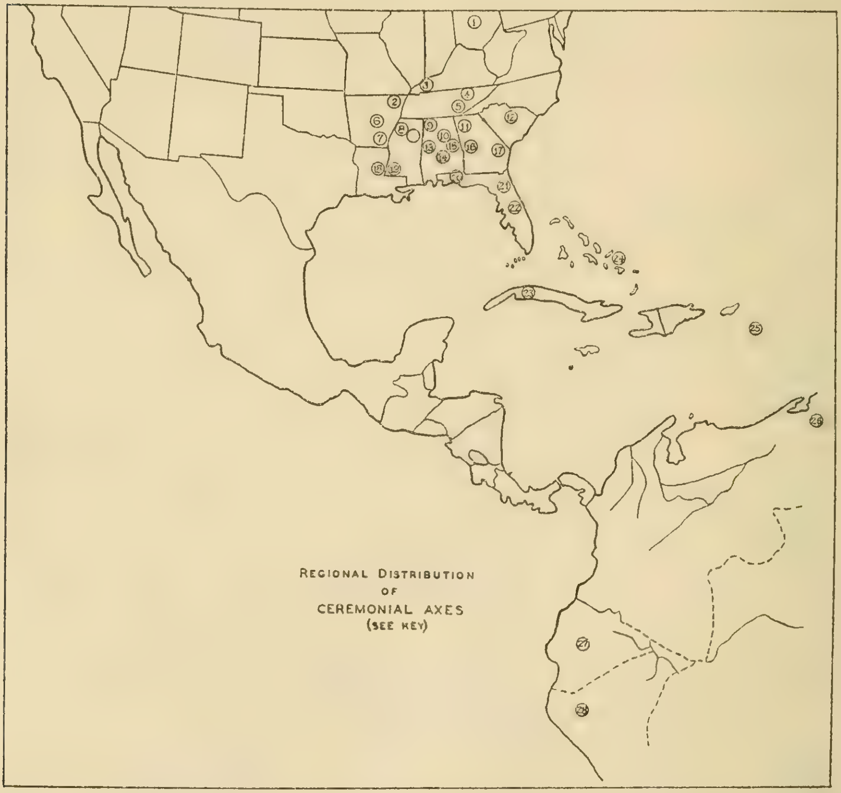


Figure 95.—1, Ashland Co., Ohio. 2, Nodena, Mississippi Co., Ark. 3, Cumberland Valley, Ky. 4, Anderson Co., Tenn. 5, Monroe Co., Tenn. 6, Pulaski Co., Ark. 7, Arkansas Post, Ark. 8, Walls, Miss.; Quitman Co., Miss.; Tunica Co., Miss. 9, Koger's Island, Lauderdale Co., Ala. 10, Coosa Co., Ala. 11, Etowah, Ga. 12, Camden, S. C. 13, Moundville, Ala. 14, Montgomery Co., Ala.; Dallas Co., Ala. 15, Mouth of Euphaupe Creek, Ala. 16, Columbus, Ga. 17, Liberty Co., Ga. 18, Across river from Natchez, Miss. 19, Natchez, Miss. 20, Washington Co., Fla. 21, Mount Royal, Fla. 22, Lake Co., Fla. 23, Matanzas, Cuba. 24, The Antilles, West Indies. 25, Guadeloupe. 26, British Guiana. 27, Ecuador. 28, Peru.

Table 37 presents 49 references from 13 authors as to its occurrence, besides that 1 reported herein from site Lu^v 92. The form of this artifact is illustrated in plate 252, figure 1, Lu^v 92.

The distribution of this form is presented in the map (fig. 95). From the fact that forms of this kind have been found in Argentina, British Guiana, Ecuador, Peru, Guadaloupe, Cuba, and the Antilles, West Indies, as well as Florida and the Atlantic States has caused some to consider that the type was imported into the southeastern United States from South America by way of the West Indies and Florida. Whatever be its source, it has spread much farther in the United States than the circular disk, and while there seems no evidence pointing to Moundville as a center of distribution, nevertheless, it is relatively numerous in that region of Alabama, and by association certainly belongs to the Moundville complex of traits.

TABLE 37.—*Occurrence of Problematical Stone, spatulate form, sometimes called Ceremonial Ax*

Author and reference [1]	Manner of occurrence and remarks	Location
Brannon, P. A., ed. (1920, vol. 1, No. 6, p. 71).	Burial site	3 miles north of Montgomery, Ala.
Brannon, P. A., ed. (1921, vol. 3, No. 1, p. 12).		3 miles west of Montgomery, Ala.
Brannon, P. A., ed. (1922, vol. 4, No. 2, p. 30).	With burial	Do.
Brannon, P. A., ed. (1922, vol. 4, No. 2, p. 42).	From Kyle Mound (2 more taken out later).	Kasihta on Alabama River, Dallas County, Ala.
Brannon, P. A., ed. (1922, vol. 4, No. 6, p. 122).		Coosa County, Ala.
Brannon, P. A., ed. (1923, vol. 7, No. 6, p. 108, pl. 34).	(In Alabama Museum of Natural History).	Moundville, Ala.
Brannon, P. A., ed. (1923, vol. 14, No. 4, p. 57, pl. 13).	Found by a Negro after a flood	Huith-le-walli Mound on Tallapoosa River, Montgomery County, Ala.
Brannon, P. A., ed. (1931, vol. 18, No. 3, p. 42).	"Unfinished 'hoe-shaped implement'."	"Recent finds in the Tennessee Valley."
Brannon, P. A., ed. (1936, vol. 21, No. 304, p. 34).		Tulsa site on Tallapoosa River near mouth of Euphaupe Creek, Ala.
Brannon, P. A., ed. (1936, vol. 21, No. 304, p. 35).	With effigy pipes and highly developed flint knives.	Do.
Brown, C. S. (1926, p. 120)	In mound with burial	Commerce, Tunica Company Miss.
Brown, C. S. (1926, p. 171, fig. 89)	(Presented to U. S. National Museum by man from Round Lake, Miss.)	Provenience not indicated. Probably Mississippi.
Brown, C. S. (1926, p. 171, fig. 90)		Grubb Place in Quitman County, Miss.
Brown, C. S. (1926, p. 171, fig. 91)	From a grave	Near Walls, Miss. (Northwes corner of State).
Brown, C. S. (1926, p. 172, fig. 92)		Natchez, Miss.
Brown, C. S. (1926, p. 173)		In Louisiana across river from Natchez, Miss.
Fewkes, J. W. (1922, pp. 150–151, pls. 9, 11, 24, 28, 79, 80, figs. 24, 25).	"Problematical Stones"	The Antilles, West Indies.
Fewkes, J. W. (1922, pp. 142–143, fig. 18).	"Perforated eared implement"	Guadaloupe, Lesser Antilles.
Fewkes, J. W. (1922, p. 147, fig. 22)	"Perforated Ax"	Do.
Fowke, G. (1896, p. 110, figs. 109, 110)	From a mound	Monroe County, Tenn.
		Mississippi County, Ark.
Harrington, M. R. (1921, vol. 1, pl. 1, p. 118, fig. 27).	Implement of stone (Carib type)	Near Matanzas, Cuba.
Hill, G. W. (1878, p. 266)	". . . pick-shaped implements of stone, highly finished . . .," plowed up.	All along valley of Black Fork, Ashland County, Ohio.
Holmes, W. H. (1884, p. 479, fig. 152)	Field grave near Menard Mound.	8 miles east of village of Arkansas Post, Ark.
Holmes, W. H. (1919, pt. 1, pp. 28, 29, fig. 17a).	"'Polished stone axes with tongue and round hole have also been described in North America, particularly in the south and southeast of the United States. South America, Ecuador, Peru, and Bolivia have also yielded axes thus pierced of stone, copper, and bronze.' "	

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[1] For complete reference, see bibliography, p. 322.

TABLE 37.—*Occurrence of Problematical Stone, spatulate form, sometimes called Ceremonial Ax*—Continued

Author and reference	Manner of occurrence and remarks	Location
Jones, C. C., Jr. (1873, p. 289, pl. 14)	Burial mound	Etowah Valley, Ga.
Jones, C. C. Jr. (1873, p. 289)		Etowah Valley, Ga., near confluence of Oostenaula and Etowah Rivers.
Moore, C. B. (1900, p. 326, fig. 47)	Three ceremonial axes, 1 possible "gorget" in shape of ceremonial ax, all associated with burials. Also part of ceremonial ax lying loose in earth.	6 miles below Montgomery, Ala.
Moore, C. B. (1900, p. 308, fig. 19)	1 ceremonial ax with burial	Durand's Bend, Dallas County, Ala.
Moore, C. B. (1900, p. 308)	1 ceremonial ax in mound	Blue Creek, Lake County, Fla.
Moore, C. B. (1900, p. 308)	1 ceremonial ax in mound	Near Lake Bluff on Altamaha River, Liberty County, Ga.
Moore, C. B. (1900, p. 341, fig. 60)	3 ceremonial axes in association with burials.	30-acre field near Montgomery, Ala.
Moore, C. B. (1905, pp. 141–142, fig. 11).	In a field	Field north of mound B, Moundville, Ala.
Moore, C. B. (1905, p. 152, fig. 26)	At a depth of 9½ ft.	Mound C, Moundville, Ala.
Moore, C. B. (1907, p. 394, fig. 90)	With burial	Moundville, Ala.
Moore, C. B. (1907, p. 394, fig. 90)	In ground aboriginally disturbed.	Moundville, Ala.
Moore, C. B. (1907, p. 398, fig. 99)	Shell pendant in form of ceremonial ax.	Moundville, Ala.
Moore, C. B. (1894, p. 39, fig. 20)	With burials.	Mounds at Mount Royal, Fla.
Moore, C. B. (1903, p. 498)	In aboriginal cemetery.	Near Point Washington, Washington County, Fla.
Moore, C. B. (1903, p. 502, fig. 28)		Argentina.
Moore, C. B. (1903, p. 502, fig. 29)		Mouth of Barina River, British Guiana.
Moore, C. B. (1903, p. 502)		Island of LaPlata, Ecuador.
Moorehead, W. K. (1932, pp. 80–81, fig. 50,c).	From the surface. Found by a son of one of the tenants who declared it lay some 400 feet east of mound A.	Etowah site, Georgia.
	With burial.	Mound C, Etowah site, Georgia.
Moorehead, W. K. (1910, p. 423, vol. 1, p. 423, fig. 371).		Cumberland Valley, Ky.
Moorehead, W. K. (1910, vol. 1, p. 425, fig. 373).	Kyle Mound.	Near Columbus, Ga.
Schoolcraft, H. R. (1852, pt. 2, p. 89, pl. 44, fig. 3).		Camden, S. C.
Thomas, C. (1894, p. 245, fig. 150)	From mound D, Knapp group.	Knapp Mounds, Pulaski County, 16 miles southeast of Little Rock, Ark.
Webb, W. S. (1938, p. 177, pl. 120)	Mound.	Clinch River, 9 miles west of Clinton, Anderson County, Tenn.
Also	Burial association.	Koger's Island, Tennessee River, Lauderdale County, Ala., site Lu^{v} 92.

THE STONE IMAGE

These stone images, representing human forms, usually cut from sandstone or other relatively soft stone, vary in maximum height from 7.5 inches to 17.5 inches. No two are alike and the range of variation is great. Usually they represent the upper portion of the human body, the legs usually being absent, and are designed with a base to sit erect. They have been called "stone idols" with seemingly no more justification than vivid imagination. That they may be attempts to represent specific individuals, rulers, or important personages and to preserve their image after death seems probable, in view of reports of early travelers suggesting that such customs may have prevailed in the Southeast. They still present, however, several unsolved problems. Our immediate interest attaches only to their occurrence. Table 38 presents 29 references by eight authors as to the occurrence of stone images, besides the finds in Pickwick Basin in site Hn° 1, Hardin County, Tenn. It would have been desirable, if possible, to have shown type forms, but such information was not readily available in most cases, and the wide variation in form prevents any classification into types. The illustration reported from site Hn° 1 must suffice.

When these images first attracted attention as "Indian relics" they so stimulated the imagination of white men in "Indian idolatry" that specimens were eagerly sought by collectors, and some specimens are reported to have brought a considerable price. This demand in turn stimulated some who, having a little ability in stone cutting and more time than morals, decided to satisfy this demand by the manufacture of stone images from limestone, marble, and a variety of stones which work well under hammer, chisel, and file. It is probable that today there are many more spurious "stone idols" than there are actual Indian artifacts of this form. It is probable that of these artifacts there has been a greater percentage "duplication for sale" than any other major artifact not even excluding pipes. No great while ago it was possible to see in many collections and in some museums stone images made from stones not ordinarily worked by the Indians and showing marks of steel chisels and marks of files.

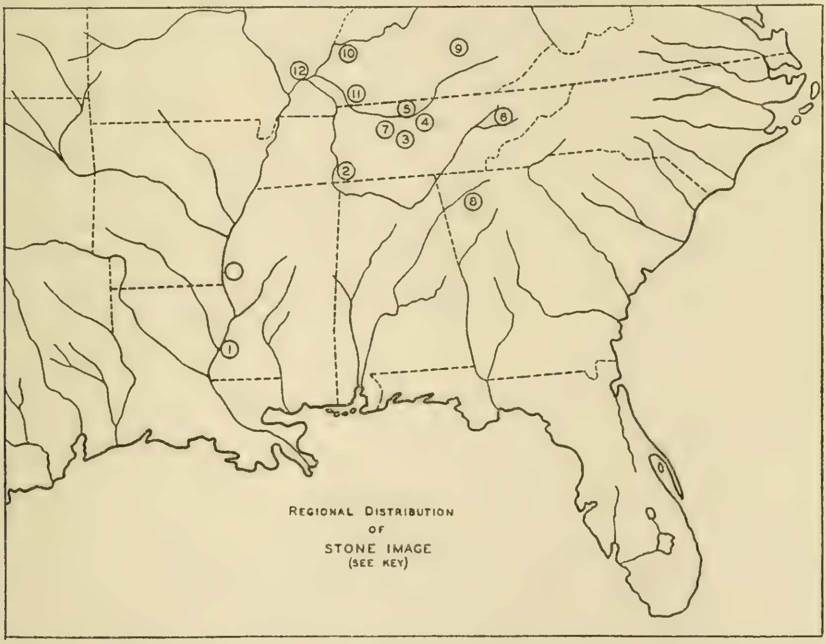

FIGURE 96.—1, Natchez, Miss. 2, Hardin Co., Tenn.; Clifton, Perry Co., Tenn. 3, Near Franklin, Tenn.; Valley of Cumberland River, Tenn.; Paris, Henry Co., Tenn. 4, Smith Co., Tenn.; Humphries Co., Tenn.; Trousdale Co., Tenn. 5, Sumner Co., Tenn. 6, Knox Co., Tenn.; Roane Co., Tenn. 7, Wilson Co., Tenn. 8, Catoosa Springs, Ga.; Etowah River, Ga. 9, Lebanon, Marion Co., Ky. 10, Henderson, Ky. 11, Cumberland River, Trigg Co., Ky. 12, Massac Co., Ill.

The one image from Panama appearing on the list was omitted on the map since the distribution is manifestly incomplete for that region. Blank circle on map indicates occurrence, location indefinite.

All of this duplication has made a difficult problem even harder to understand.

The map in figure 96 presents the occurrence of specimens of seeming undoubted authenticity. It will be noted that their distribution seems to center about the State of Tennessee and in that State in the general vicinity of the Cumberland River. So far, no specimen is reported from the State of Alabama, although site Hn° 1 missed being in Alabama by only a few hundred feet. Certainly, there seems nothing to suggest connection with Moundville, although at Etowah, Ga., seven or more of these images have been found. They seem there, as elsewhere, to be associated with the use of stone graves.

Recently, a stone image, about 7 inches in height, was found in a mound of the Kincaid group in Massac County, southern Illinois, by the University of Chicago field party excavating at this site.

During the excavation of mound C on the fatherland plantation (Ford, 1936, p. 61) near Natchez, Miss., by M. B. Chambers in 1930, there was found in burial association a stone effigy of a human head. This stone effigy head has all the appearance of having been broken from a stone image in human form. This may represent, therefore, the occurrence of another stone image. Because it was incomplete, it has not been listed in the table of occurrences. It does not present, however, a new region—since an image has been reported from that vicinity by C. C. Jones.

TABLE 38.—*Occurrence of stone image*

Author and reference[1]	Manner of occurrence and remarks	Location
Clark, W. M. (1877, p. 275)	With burial. Cut from solid block of sandstone; weight 27½ pounds.	"Old Town," 7 miles northwest of Franklin, Tenn.
Clark, W. M. (1877, p. 276)	With burial. Cut from sandstone; weight 8 pounds. Probably intended for female.	Do.
Clark, W. M. (1877, p. 276)	With burial. Represents female with peculiar headdress, the hair being in folds and divided into three separate parts with knot on top of head.	Do.
Holmes, W. H. (1888, pp. 24, 25)	On surface, 9 inches high. Another image, more boldly carved and 5¼ inches high found in same locality.	Near the Gulf of Dolce, Panama. 82°55′ W.
Jones, C. C. (1873, p. 432)	Male figure, sitting posture, 18 inches high.	Catoosa Springs, Ga.
Jones, C. C. (1873, p. 432)	Plowed up near large mound. Cut from coarse, dark sandstone; 12 inches high. Another one "recently" [1873] found in same neighborhood (next reference).	Etowah River, Ga.
Jones, C. C. (1873, p. 433, pl. 26)	Plowed up on plantation. Female	Do.
Jones, C. C. (1873, p. 437)	Plowed up on top of mound. Cut from sandstone. Female.	Bledsoe's Lick, Sumner County, Tenn.
Jones, C. C. (1873, p. 437)	Dug up on site of old Indian temple	Natchez, Miss.
Jones, C. C. (1873, p. 438)	Dug up on farm. Cut out of hard rock. Female.	Fall Creek, Wilson County, Tenn.
Jones, C. C. (1873, p. 439)	Plowed up on farm. Cut from stone, sitting posture; 13 inches high.	8 miles south of Grave Creek Flats, Tenn.
Jones, C. C. (1861, pp. 108, 109)	Plowed up. Cut from coarse, dark sandstone; 12 inches high. Sitting posture, knees drawn up on level with chin, retreating forehead and chin. Full head of hair gathered into knot behind.	Within the enclosure formed by the Moat and the Etowah River at Etowah Mound group, Ga.
Jones, J. J. (1876, p. 128, fig. 66)	In a cave. Cut from crystalline limestone.	On the banks of the Holston River, Knox County, Tenn.

[1] For complete reference, see bibliography, p. 322.

TABLE 38.—*Occurrence of stone image*—Continued

Author and reference	Manner of occurrence and remarks	Location
Jones, J. J. (1876, p. 129, figs. 67, 68).	In neighborhood of numerous stone graves and pyramidal mounds. 2 stone images. Cut from dark sandstone; 13 inches and 11 inches high; 1 male, 1 female.	In the valley of the Cumberland River, Tenn.
Jones, J. J. (1876, p. 131)	Plowed up near mound	Paris, Henry County, Tenn.
Jones, J. J. (1876, p. 131)	From a mound surrounded by stone graves. Cut from coarse sandstone; 7½ inches high. Male.	Near Clifton, Perry County, Tenn., 4 miles south of Tennessee River.
Jones, J. J. (1876, p. 135)	2 images, 1 male and 1 female, cut from sandstone 16 inches high.	Smith County, Tenn.
Moorehead, W. K. (1932, p. 100)	2 stone images in stone grave	On bank of Duck River, Humphries County, Tenn.
Moorehead, W. K. (1932, pp. 12, 29, fig. 3).	Small stone grave 2 feet below surface, mound C. 17½ inches high. Probably mortuary statue.	Etowah, Ga.
Moorehead, W. K. (1932, p. 29)	Portion of statue from small stone grave 2 feet below surface, mound C. Crudely fashioned from soft stone.	Do.
Moorehead, W. K. (1932, p. 31)	Well-executed image. Probably a mortuary statue.	Stilesboro, a short distance from Etowah, Ga.
Moorehead, W. K. (1932, p. 29)	Plowed up near base of mound. Well-executed female 15¾ inches high. Probably mortuary statue.	Etowah, Ga.
Thomas, Cyrus (1894, pp. 360, 361).	With burial in mound. 14½ inches high.	Long Island Mound No. 3, Roane County, Tenn.
Thomas, Cyrus (1894, p. 306, fig. 191).	In one of low mounds. Bust carved from coarse marble; 11 inches high.	Etowah Mound group, Ga.
Thruston, G. P. (1890, p. 104, pl. 4).	3 images of gray sandstone 12 to 13 inches high.	All within general section occupied by the stone-grave race in middle Tennessee; 1 from Williamson County, 1 from Trousdale County, and 1 from Smith County, Tenn.
Thruston, G. P. (1890, p. 107)	Plowed up in field (specimen destroyed).	Smith County, Tenn.
Young, B. H. (1910, p. 262)	Earth mound	Marion County, near Lebanon, Ky.
Young, B. H. (1910, p. 262)	Earth mound	Trigg County on Cumberland River.
Young, B. H. (1910, p. 262)	Bank of Ohio River	Henderson, Ky.
	Burial mound	Tennessee River, Hardin County, Tenn., site Hn^{o} 1.

COPPER PENDANTS

These artifacts are usually found in burial association. They are made from very thin sheet copper and usually occur in groups of from 5 to 15 in a single cache. They are usually embossed, and the outline carefully cut to form. They are approximately 4 inches long and about 1.5 inches broad. Those illustrated in site Lu^{v} 92 are typical.

Table 39 presents 13 references from two authors besides those found during the survey on Koger's Island, in the Tennessee River in Alabama, and those recently found at Moundville, Ala.

The map showing their distribution (fig. 97) reveals that only one site outside of Alabama has yielded these artifacts. From the number of occurrences in and about Moundville, it would appear that Moundville may well be regarded as the center of distribution of this type of artifact.

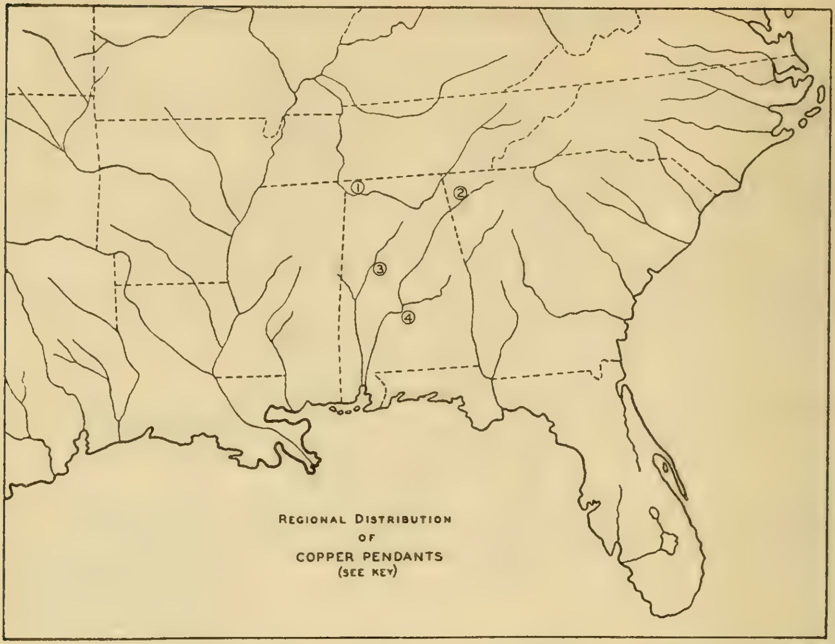

Figure 97.—1, Lauderdale Co., Ala. 2, Etowah, Ga. 3, Moundville, Ala. 4, Montgomery Co., Ala.

Table 39.—*Occurrence of copper pendant*

Author and reference [1]	Manner of occurrence and remarks	Location
Moore, C. B. (1900, p. 341)	With burial in mound	30-acre field, Montgomery County, Ala.
Moore, C. B., (1900, pp. 326, 327, fig. 49).	11 pendants with burials. Also 2 pendants having "wavy" outline.	Mounds on the Charlotte Thompson place about 6 miles below Montgomery, Ala.
Moore, C. B. (1900, pp. 342, 343, figs. 66, 67).	16 pendants found with burials in small mound.	30-acre field, Montgomery County, Ala.
Moore, C. B. (1905, p. 346)	"Deposit of pendants" within mound	Big Eddy field, ½ mile SW. of 30-acre field, Montgomery County, Ala.
Moore, C. B. (1905, pp. 196, 197, fig. 104).	With burial (adult male), 13 pendants of sheet copper, all similar, no 2 exactly alike; each in form of an "arrowhead" bearing a repoussé eye.	Mound H, Moundville, Ala.
Moore, C. B. (1905, p. 154, fig. 29)	"Ornament of sheet copper in small fragments which, put together, form in part a gorget with scalloped margin, having 3 roughly circular lines surrounding a swastika . . ."	Mound C, Moundville, Ala.
Moore, C. B. (1905, pp. 155, 156, fig. 32).	Pendant of sheet copper encased in decayed wood.	Mound C, Moundville, Ala.
Moore, C. B. (1905, p. 163, fig. 41)	With burial, mound C	Moundville, Ala.
Moore, C. B. (1905, p. 217, fig. 134)	Round sheet copper gorget possibly part of pendant. With burial, mound O.	Do.
Moore, C. B. (1905, p. 160, fig. 38)	2 "circular sheet copper ornaments," possibly parts of pendants. With bones of child, mound C.	Do.
Moorehead, W. K. (1932, pp. 40, 42, fig. 17).	10 copper pendants from grave 6a, mound C, 13 feet below surface.	Etowah, Ga.
Moorehead, W. K. (1905, p. 42, fig. 18).	14 copper pendants from mound C	Do.
Moorehead, W. K. (1905, p. 45, fig. 23).	Copper pendant showing 4 swastikas from stone grave burial 9 feet below surface.	Do.
Also	9 stamped copper pendants, all similar, no two exactly alike.	Koger's Island, Tennessee River, Lauderdale County, Ala. Site Lu^{v} 92.
	Copper pendants from recent excavation by Alabama Museum of Natural History.	Moundville, Ala.

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[1] For complete reference, see bibliography, p. 322.

THE MONOLITHIC AX

This very unique artifact is not numerous anywhere, but since it has been found at Moundville, which seems to be so closely connected culturally with one of the later peoples occupying sites in Pickwick Basin, it was of interest to discover as far as possible its distribution.

The following table (40) presents 12 references to monolithic axes from nine authors. From these references it is apparent that there is no area of concentration of this artifact, and that it is relatively rare. The map (fig. 98) shows the distribution of sites on which it occurred. It is to be noted that, like the spatulate form of ax, it has been found far to the south in Cuba, Hispaniola, Puerto Rico, Honduras, and Nicaragua. This may suggest that it has been introduced into this country by way of the West Indies.

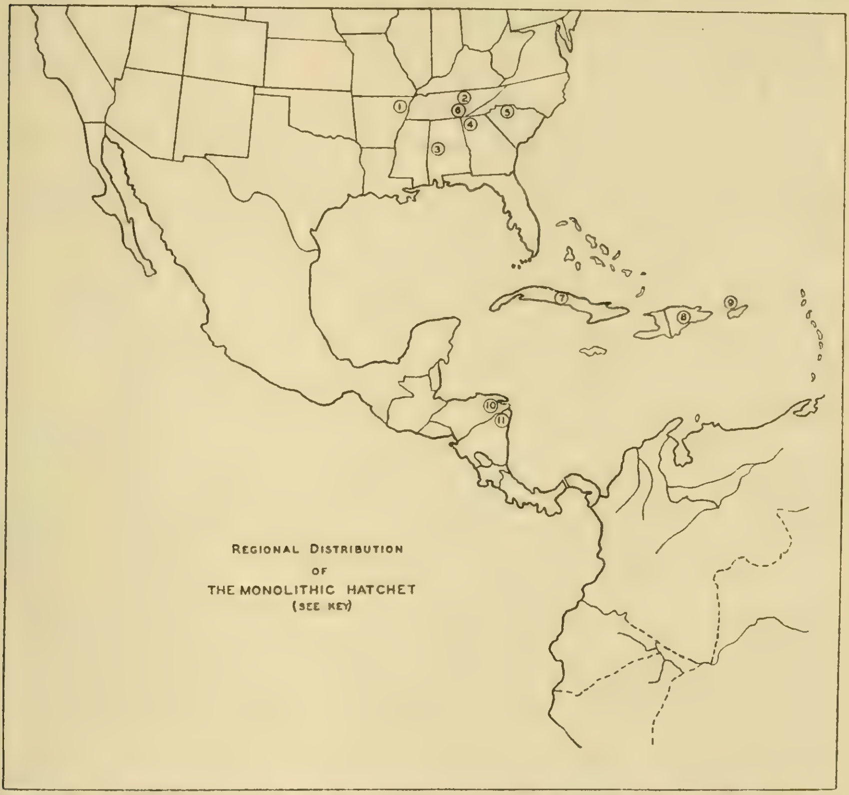

FIGURE 98.—1, Mississippi Co., Ark. 2, On Cumberland River near Nashville, Tenn. 3, Moundville, Ala. 4, Etowah Site, Ga. 5, York District, S. C. 6, Hamilton Co., Tenn. 7, Cuba. 8, Hispaniola. 9, Puerto Rico. 10, Honduras. 11, Nicaragua.

TABLE 40.—*Occurrence of monolithic ax*

Author and reference [1]	Manner of occurrence and remarks	Location
Fewkes, J. W. (1922, pp. 173, 174, figs. 29, 30).	"Monolithic Petaloid Celts" (2 specimens described).	Puerto Rico.
Fewkes, J. W. (1907, p. 95, pl. 14).	------	Santo Domingo, Hispaniola, West Indies.
Harrington, M. R. (1921, pp. 60, 61, fig. 3).	In cave with potsherds	Ovando, Cuba.
Jones, C. C., Jr. (1873, p. 281)	Burial mound	York district, S. C.
Jones, J. J., (1876, p. 46, fig. 11)	Under the head of a male skeleton in burial mound.	Mound on bank of Cumberland River opposite Nashville, Tenn.
Moore, C. B. (1905, pp. 133, 135, fig. 6).	Plowed up by a colored man near one of the large mounds.	Moundville, Ala.
Moorehead, W. K. (1932, pp. 81, 82, fig. 52a).	With burial in mound C	Etowah site near Cartersville, Ga.
Moorehead, W. K. (1932, p. 100).	Fragment (about ⅕) found on surface near center of Etowah village site.	Do.
Moorehead, W. K (1932, p. 100)	Fragment (about ⅔) found on surface.	Hawkins site, 9 miles from Etowah site, Ga.
Thruston, G. P. (1890, pp. 258, 259).	------	Mississippi County, Ark.
Saville, M. (1925, pp. 34-36, fig. 15).	Eight axes	Mosquitia on Atlantic coast of Honduras and Nicaragua.
Also	One specimen from excavation of mound.	Hamilton County, Tenn.

[1] For complete reference, see bibliography, p. 322.

GENERAL CONCLUSIONS

This survey, which has permitted the excavation in whole or in part of 19 sites, has shown that these sites fall into a few culturally similar groups. It is convenient to discuss relations between sites by considering together the sites of each group. These groups may be described as follows:

(1) Earth burial mounds and villages representing the occurrence of the copper-galena complex of traits were found. This complex has been reported previously (Webb, 1939, p. 201) and designated as a Copena Focus. Five mounds and two villages belonging to this complex were excavated. They were Lu^{o} 63, Lu^{o} 64, Lu^{o} 54, Hn^{o} 4 mound and village, Hn^{o} 49, and Lu^{v} 65.

(2) Shell mounds or middens used as habitation and burial sites occurred. In 9 of these separate great shell middens, 10 excavations were made; 5 were quite extensive. These were Lu^{o} 5, Lu^{o} 59, Lu^{o} 61, Lu^{v} 62, Lu^{o} 67, Lu^{o} 72, Ct^{o} 27, Ct^{o} 34, and Lu^{o} 25, Units 1 and 2.

(3) Domiciliary earth mounds and villages used by the manufacturers of shell-tempered pottery. Three sites—two mounds and one village—were in this group. These were Lu^{o} 21, Hn^{o} 1, and Lu^{v} 92.

(4) A single cave which showed occupancy. It is reported as Ct^{c} 42.

In attempting to evaluate the archeological finds in this basin, each site in any group is compared to other sites of the same group within the basin. An attempt is made to determine the degree of relationship, if there be sufficient similarities between sites. If it appears worth while, a list of cultural traits relating sites in any one group is worked out for the group. In seeking other relations, this group of traits may then be compared with the trait complex from any site or group of sites outside this area.

THE COPENA FOCUS

As the result of excavations in Wheeler Basin (Webb, 1939), it was possible to recognize a fairly homogeneous group of 38 cultural traits associated with the occurrence of copper and galena in earth burial mounds. This group of cultural traits was tentatively designated the Copena Focus of the Southern Aspect of the Hopewellian Phase. It is perhaps not necessary here to repeat the arguments for the suggested classification of this complex of traits. During the survey of Pickwick Basin, six additional sites representing five mounds and two villages, which seem to belong to this focus, were excavated. These sites were designated as follows:

	Site
Wright Mound, No. 1	Lu^{o} 63.
Wright Mound, No. 2	Lu^{o} 64.
Wright Village site	Lu^{v} 65.
Colbert Creek site	Lu^{o} 54.
Boyd's Landing site	Hn^{o} 49.
Fisher Mound and Village (pit areas x1, x2, and x3)	Hn^{o} 4.

The propriety of designating this group of sites as belonging to the Copena Focus seems as obvious as the necessity for their classification since each site represents a single component of this focus. In this group of sites, Lu^{v} 65 was manifestly a village, since remains of a midden were present. It was excavated in the hope that a Copena village might certainly be identified. Site Hn^{o} 4 presented an earth mound, and three small areas outside the mound, designated x1, x2, and x3, represented burial plots in the field. There was no midden in association with these small areas, but definite Copena burial pits were found. Clearly, the traits from these two sites—one a village and the other a group of small cemeteries—could hardly be expected to yield a high correlation to a list of traits originally set up to describe Copena earth mounds. For this reason, in the tabulation of traits, these two sites have been associated in order to present, if possible, a basis for a Copena village complex. In this group of traits there is a total of 45 traits of which only 18 are common to the mound group. It is not certain that all traits listed for Lu^{v} 65 are Copena traits, although they were found on this site.

In the table 41, the mound traits have been listed in parallel columns with the village traits to show wherein the similarity lies. This group also contains a total of 45 mound traits. The original Copena list of traits for Wheeler Basin had a total of 36 traits. Two of the original traits have here been discarded. One of these traits, No. 6, an attempt to describe the poor condition of skeletal material, may not properly be regarded as a cultural trait, although it does state a commonly observed fact. Trait No. 11, although still true of all sites, has been discarded because of its negative quality. The occurrence of the remaining 34 original traits on these new sites has been indicated by placing the old trait number immediately after the trait in this new tabulation. This tabulation shows a considerable percentage occurrence of the traits of the original Copena list on these sites. However, it should be recalled that many of the original Hopewellian sites show a complete absence of important traits of the complex. That is to say, to obtain as complete a picture of the complex as possible, a trait list must be compiled from many sites. Often sites definitely belonging to the complex may show a rather low percentage correlation to the total complex. Thus, no one site will possess all the traits of the complex. This is precisely the case in these Copena sites in Pickwick Basin. Site Hn° 49 has been so destroyed by river erosion and previous digging that it yielded but few artifacts and no burials. These facts prevented it from having a high correlation to the total complex. However, the other four sites show some considerable similarity. Each site represents a single component only. That is, each is a cultural unit. There is no stratification and mixture of specimens belonging to any other established complex. Because of the considerable divergence among components of this complex, shown by the occasional absence of well recognized traits, it is to be expected that these six new sites might yield some additional traits not before assigned to this complex. Eleven additional traits have been found to occur—each in at least two components in this complex—in sufficient frequency on some sites to warrant their tentative inclusion in the list of traits diagnostic of the Copena Focus.

It should be noted that, while these six sites have yielded these additional traits, they produced no pipes; they had no exceptional artifacts placed under the head of the skeleton; and they offered no evidence of ceremonial "killing" of either stone or copper artifacts, although all of these traits were associated with the Copena complex as described in Wheeler Basin. In order to show how this list of mound traits follows the original complex, the traits for sites La° 37 and La° 14 Wheeler Basin have been placed in parallel columns.

The results of these excavations have emphasized the use of puddled clay in burials in some of these sites and the use of fire in connection with the burials. In some cases a fire was built on the grave, on top of the clay covering the body, before the grave was filled with earth. The use of logs and bark about the graves and the use of fire in connection with the burials were apparent to the extent shown in the tabulated list of traits.

So far, from what is known of the Copena Focus, it is not possible to place it chronologically except that it lies wholly within the prehistoric but probably in the pottery era. It is not certain that they made or used pottery, but crushed limestone-tempered potsherds often occur, seemingly as inclusions in mounds of this complex. As yet, no vessel or even a sherd has been found in certain association with any burial. It has not been possible to suggest any ethnological or historic connection for this culture complex aside from evidence placing it in an aspect within the Hopewellian phase. The only suggestion of any possible connection with other archeological cultural complexes is derived from the considerable and varied use of puddled clay. The method of sealing bodies, extended in the flesh between thick layers of foreign clay, is a trait found in some sites in Kentucky, and is there regarded as belonging to the Adena Aspect.

TABLE 41.—*Traits of the Copena Focus and sites where found*

Traits of the Copena Focus[1]	Village site		Mound site					Wheeler Basin site	
	Lu^{v} 65	x1-x2-x3	Lu° 63	Lu° 64	Lu° 54	Hn° 4	Hn° 49	La° 37	La° 14
General traits:									
Circular post-mold pattern	1	------	------	------	------	------	------	------	------
Circular puddled-clay fire basin	1	------	------	------	------	------	------	------	------
Fire-broken pebbles in fire basin	1	------	------	------	------	------	------	------	------
Subsoil storage pits	×	×	------	------	------	------	------	------	------
Site in vicinity of large river (34)	×	×	×	×	×	×	×	×	×
Galena scattered throughout site (23)	×	6	11	×	×	18	×	×	×
Scattered post molds (3)	×	×	×	×	------	×	------	------	------
Conical earth mounds (1)	------	------	×	×	×	×	------	×	×
Mounds occurring in groups (35)	------	------	×	×	×	------	------	------	------
Sections of bark in mounds	------	------	2	4	------	------	------	------	------
Burial traits:									
Burial in fire basin	1	------	------	------	------	------	------	------	------
Subsoil burial pits (9)	3	7	9	10	8	4	------	×	------
Charcoal in burial pits	------	3	------	×	×	×	------	------	------
Galena masses in burial pits (12)	------	3	10	13	10	26	------	×	×
Artifacts accompanying subsoil burials (10)	×	×	×	×	×	×	------	×	×
Burial pits with foreign clay at bottom (4)	------	3	1	12	------	17	------	------	------
Extended burials (5)	------	×	16	29	8	31	------	×	×
Flexed burials (14)	3	×	------	1	7	23	------	×	×
Evidence of fire in burial pits	------	3	------	------	------	×	------	------	------
Post molds associated with burial pits	------	3	------	------	------	×	------	------	------
Burials inclusive in mounds (2)	------	------	16	×	14	×	------	×	×
Graves covered with logs and bark	------	------	×	×	×	×	------	------	------
Cremations (7)	------	------	1	2	------	7	------	------	------
Red ochre in graves	------	------	------	1	------	1	------	------	------
Puddled-clay covering of bodies	------	------	------	4	------	8	------	------	------
Puddled-clay pillows	------	------	------	2	------	------	------	------	------
Skull disarticulated, separate (8)	------	------	------	------	------	1	------	×	------
Mica as burial furniture (13)	------	------	------	------	------	2	------	------	------
Spades or other exceptional artifacts placed under head of skeleton (15)	------	------	------	------	------	------	------	×	×
Artifact traits, stone:									
Lapstone-mortar	3	------	------	------	------	------	------	------	------
Circular hammerstones, concave pits	2	------	------	------	------	------	------	------	------
Two-holed bar gorget (21)	1	------	------	------	------	------	------	------	------
Incised cannel-coal disk	1	------	------	------	------	------	------	------	------
Flint scrapers	×	------	------	------	------	------	------	------	------
Flint knives	×	------	------	------	------	------	------	------	------
Drills	×	------	------	------	------	------	------	------	------
Broad-stemmed points	×	------	------	------	------	------	------	------	------
Triangular points	×	×	------	------	------	------	------	------	------
Small greenstone celts	17	3	------	------	------	------	------	------	------
Greenstone spades or hoes (19)	1	------	1	1	5	1	------	×	×
Copena points	10	×	1	2	1	15	------	------	×
Folsom points	1	------	1	------	1	------	------	------	------
Greenstone celts, large 17 to 7 inches (16)	------	------	1	1	2	5	------	×	×
Pipes, elbow form (17)	------	------	------	------	------	------	------	×	×
Pipes, large zoomorphic steatite (18)	------	------	------	------	------	------	------	×	------
Stone artifacts—spades, celts, pipes—intentionally broken and deposited (22)	------	------	------	------	------	------	------	×	×
Artifact traits, copper:									
Pin	1	------	------	------	------	------	------	------	------
Bar	------	1	------	------	------	------	------	------	------
Reel-shaped objects (26)	------	2	2	4	------	------	------	×	×
Celts about 5 inches long (27)	1	------	1	×	------	------	×	×	×
Beads, spherical, drilled (28)	------	------	×	×	×	×	------	×	------
Beads, cylindrical rolled sheets (29)	------	------	------	2	×	11	------	×	------
Spool-shaped ear ornaments (30)	------	------	5	6	------	1	------	×	×
Bracelets, flat bar bent end to end (33)	------	------	------	6	------	------	------	------	------
Rectangular breastplates	------	------	2	------	------	1	------	------	×
Reels or other exceptional copper artifacts intentionally broken and deposited (32)	------	------	------	------	------	------	------	×	------
Bead with stained teeth (31)	------	------	------	------	------	------	------	×	------
Artifacts, miscellaneous:									
Antler spear point	1	------	------	------	------	------	------	------	------
Antler flaker or drift	1	------	------	------	------	------	------	------	------
Cannon-bone awl	1	------	------	------	------	------	------	------	------
Bone-splinter awl	6	------	------	------	------	------	------	------	------
Disk shell beads (24)	------	------	2	------	------	2	------	------	------
Large marine-shell vessels (25)	------	------	1	------	------	2	------	------	------
Woven textiles preserved by copper (36)	------	------	5	×	------	------	------	------	------
Matting twilled plaiting	------	------	×	------	------	------	------	------	------

[1] Total village traits, 45; total mound traits, 45; traits common to both groups, 18.

TABLE 41.—*Traits of the Copena Focus and sites where found*—Continued

Traits of the Copena Focus	Village site		Mound site					Wheeler Basin site	
	Lu° 65	x1–x2–x3	Lu° 63	Lu° 64	Lu° 54	Hn° 4	Hn° 49	La° 37	La° 14
Pottery traits:									
Pottery disks perforated	2								
Round-bottom vessels	×								
Strap handles, limestone tempered	×								
Folded rims or added rim strips	×								
Sand-tempered pottery	×	×							
Crushed-limestone-tempered sherds	×	×	×	×	×	×			
Total	37	20	28	30	19	30	3	23	18
Percent of total	80	44	62	66	42	66		51	40

TABLE 42.—*Rearrangement of the mound traits of the Copena Focus to determine traits most basic and characteristic as determined by four new sites in the Basin, and a comparison with traits found at two sites in Wheeler Basin*

Traits	Pickwick Basin site				Wheeler Basin site		Total
	Lu° 63	Lu° 64	Lu° 54	Hn° 4	Lu° 37	Lu° 14	
Reels or exceptional copper pieces "killed"					×		1
Long copper bead with teeth					×		1
Stone artifacts "killed"					×	×	2
Flat bar gorget, steatite, or chlorite							
Pipes, elbow form					×	×	2
Spades, exceptional artifacts under head					×	×	2
Matting	×						1
Puddled-clay pillows		×					1
Bracelets, flat bar bent end to end		×					1
Evidence of fire in burial pits				×			1
Post molds associated with burial pits				×			1
Mica as burial furniture				×			1
Skulls, disarticulated, separate				×	×		2
Red ochre occurrence		×		×			2
Puddled clay covering bodies		×		×			2
Copper breastplates	×						1
Sections of bark in mounds	×	×					2
Woven textiles preserved by copper salts	×	×					2
Large marine-shell vessels	×			×			2
Disk shell beads	×			×			2
Folsom flint points, broken	×		×				2
Copper reel-shaped objects	×	×			×	×	4
Copper celts about 5 inches long	×	×			×	×	4
Scattered post molds	×	×		×			3
Mounds occurring in groups	×	×	×				3
Copper spool ear ornament	×	×		×	×	×	5
Beads, cylindrical rolled sheet		×	×	×	×	×	5
Cremation	×	×		×			3
Charcoal in burial pits		×	×	×			3
Flexed burials		×	×	×	×	×	5
Pits floored with foreign clay	×	×		×			3
Graves covered with logs or bark	×	×	×	×			4
Copper beads, spherical, drilled	×	×	×	×	×		5
Conical earth mounds	×	×	×	×	×	×	6
Copena points	×	×	×	×		×	5
Spades, schist, large 1 by 6 by 26 inches	×	×	×	×	×	×	6
Galena masses in burial pits	×	×	×	×	×	×	6
Extended burials	×	×	×	×	×	×	6
Limestone-tempered pot sherds	×	×	×	×			4
Site in vicinity of large river	×	×	×	×	×	×	6
Galena scattered throughout site	×	×	×	×	×	×	7
Greenstone celts 17 to 7 inches long	×	×	×	×	×	×	7
Artifacts accompany subsoil burials	×	×	×	×	×		5
Burials inclusive in mounds	×	×	×	×	×	×	6
Total	27	29	18	28	22	18	142

Because of the meagerness of the information on Copena villages, it is not possible to attach any great significance to the list of "village traits." However, four mounds show a fairly homogeneous group of traits which at present represent the best available picture of this focus. These traits have, therefore, been rearranged in the order of importance of their occurrence in table 42. In the table, traits of two sites in Wheeler Basin have been included for comparison.

SHELL MOUNDS

The shell mounds along the Tennessee River in northern Alabama present a very interesting and important archeological problem. They are unique in many ways. They are the most extensive records of man's prehistoric occupancy that remain in the valley today. Shell mounds probably represent the first occupancy of man in this region, and some of them may be very old as measured in centuries. The 10 excavations made in 9 of these great middens are designated as follows:

	Site		Site
Smithsonia Landing	Lu^{o} 5.	Meander scar	Lu^{v} 62.
Perry site, Unit 1	Lu^{o} 25.	Long Branch site	Lu^{o} 67.
Perry site, Unit 2	Lu^{o} 25.	Union Hollow	Lu^{o} 72.
Bluff Creek site	Lu^{o} 59.	Mulberry Creek	Ct^{o} 27.
O'Neal site	Lu^{o} 61.	Georgetown	Ct^{o} 34.

It was possible to investigate four (Lu^{o} 25, Lu^{o} 59, Ct^{o} 27, and Lu^{o} 67) of these large sites rather extensively. One site (Lu^{v} 62) proved to be relatively small. Excavations on four of these sites (Lu^{o} 5, Lu^{o} 72, Lu^{o} 61, and Ct^{o} 34) were in progress at the time of the flooding of the basin. Since the time for flooding was advanced many months over the original schedule, these sites were inundated before excavations were completed. One marginal site was excavated after the basin was filled, since a portion of it extended to such an elevation that the bottom of the trench reached the lowest deposit of shell without penetrating the water table. In every case—because of the seemingly great importance of the archeological record revealed by these shell mounds—excavations were as extensive as time, available labor supply, and physical conditions permitted. The story, as revealed by the shell mounds, is a complicated record of occupancy alternating with river floods. Evidently these floods dispossessed the occupants of any particular site for a brief time and left over the site a deposit of sand, clay, or silt. Always the inhabitants soon came back—by inference, the same or similar people—since the same customs would be continued as before and the same material culture evidence would be found. In the long history of this occupancy, probably requiring centuries, there is, in some cases, a noticeable and gradual change in type of artifacts used. There is definite proof that from time to time the advent of new ideas created additions to the material culture of these people, but the old customs and materials persisted. In short, there is a type of stratigraphy observable in these great middens, but it does not seem to indicate a displacement of one people by another, or to suggest any abrupt discontinuities attributable to a shift in population. The only exception to this is in the appearance of the shell-tempered pottery people in the very last and closing epoch of the shell mounds. This period was relatively short and, hence, from the standpoint of its contribution to shell-mound history, relatively unimportant.

Burial customs present one of the most difficult problems of interpretation. In making burials, it is obvious that certain methods of procedure were recognized by these people and in any case were very definitely followed. However, the methods varied widely so that it was possible to recognize five burial types, and in some cases several subtypes occurred within a type, but within each subtype all burials were made exactly alike. In general, it not only was possible to classify burials as to type, but in many cases to observe stratigraphy of burial customs. Yet this stratigraphy seems to have no significance culturally, since the material culture of the people remained unchanged and there appears no significant difference in skeletal material taken from burials of different types, with the possible exception of the extended burials near the midden surface. It therefore appears that these shell mounds largely represent the accumulated midden debris of a people who for many centuries lived in the valley at points convenient to their food supply. There may have been some shifting of population from site to site, but broadly, all of these sites have had a somewhat similar cultural development. The different types of burial customs are described in detail in the report on site Lu° 67 and Ct° 27.

In the types of burials described there, as a type, the round grave, made in a pit just large enough to hold the body closely flexed, was made to cover all fully flexed burials. Where it was possible to observe the pit, the burial was obviously a "round grave." In some cases, however, where the pit was originally very shallow, or because of disturbances or creeping of the shell, some "round graves" are hardly distinguishable from the type ordinarily designated fully flexed. For this reason in "conclusions," "fully flexed" burials are recorded as a trait from some sites when in the site report all were included in the "round-grave" tabulation, that is, the round grave was made to include those with evident pits and also those without.

Not all shell middens are of the same age, but the deeper middens seem to have been those first used. To understand and properly evaluate the cultural evidence from shell mounds, one must, in a measure, reconstruct the life of those who built them. The most obvious fact about the shell mounds is that they are on the immediate bank of the river, so near that they are at times subject to erosion by the river and to silting by floods. They are always adjacent to a shoal in the river, on which great quantities of *Mollusca* of many species were to be found. These fresh-water mussels, pelecypods, and gastropods were highly regarded as the main source of their food supply by the early inhabitants of the valley. Not only was there a great variety in the food of this kind, but its never-failing supply encouraged men to live near such a certain source. Seemingly, they did not carry the mussels very far from the shoals before using them for food. It may be very probable that the huge amount of shell in any midden has all come from the river in the immediate vicinity. Certain it is that wherever shoals appeared in the river, there on the bank, often on both sides of the river and sometimes on islands near by, shell mounds are to be found. In the early history of these mounds, shellfish seem to have been the major source of food supply, although bones of fish and waterfowl are to be found, and also the horns and bones of deer, sparingly. It is quite apparent that the river furnished a considerable portion of their food. Fish of many species were used, the drum constituting the most numerous remains. Turtles were used frequently for food as were many species of waterfowl and scores of species of pelecypods and gastropods. It appears that life on the shell mounds was very simple in the early stage of the midden. It is not certain to what degree food was cooked at that time. There were fires, to be sure, but one wonders if so few fires could have cooked the large number of shellfish as represented by the middens. As the mounds grew in height, clay floors with fire hearths were built, and there are to be found zones in the shell containing great quantities of river pebbles broken by fire together with much ashes and charcoal. These findings would seem to indicate that "hot rock" cooking may have been common. Also "clambakes" on hot rocks were used in the mounds. These clambakes became numerous in the later period of the middens and in some cases quite elaborate. It thus seems that in the early stages of these middens, although fires were found, perhaps much of their food—more probably the shellfish—was consumed raw. Later, fire hearths were constucted, and the presence of much broken rubble shows the result of cooking by heated stones. Later, but before the advent of clay pottery, large vessels of sandstone and steatite were cut from solid stones and undoubtedly were used in cooking. Some of these vessels, found broken and shattered, appear to have suffered from fire action. After pottery became common, in the late history of the midden, it was doubtless an important adjunct to cooking. It seems possible, therefore, to discern in these shell middens a gradual development of the processes of cooking. Such development, which was quite slow, was also indicated by greater quantities of ashes in the midden.

On most shell mounds in Alabama, on the surface, potsherds are found mingled with the shell. As excavations go deeper, it is observed that potsherds are in a comparatively thin layer on the surface. This layer, varying in thickness from 1 foot on some sites to 6 feet on others, contains all of the sherds to be found on the site. Thus, it is very easy to demonstrate that there is a pottery zone, usually not deep, below which not a single sherd of pottery occurs. Where the zone is quite shallow, types of many kinds of pottery occur mingled in the shell, and it is impossible to show stratigraphy in type. But even in such cases, the pottery does not appear abruptly, but the number of sherds increases from the bottom of the pottery zone upward. Where the pottery zone is thicker, it is possible to see stratigraphy of type, but again, each type begins gradually and proceeds upward to an increased occurrence which is usually on or near the midden surface. And again, while pottery thus has a lower boundary below which it does not occur, it is notable that the flint artifacts occurring below this boundary extend upward and cross into the pottery zone without any noticeable change in either type or frequency of occurrence. This seems to demonstrate that the use of pottery was acquired very late in the history of these middens, and also that pottery was unknown to the occupants for most of the period of the building of these shell mounds. The further fact that nearly every type of pottery temper found elsewhere in the general region of the Southeast occurs in the pottery zone would seem to indicate the importations of pottery had many sources. In fact, the order of appearance of different types of potsherds in these shell middens is taken to be the order in which such types were available to these people, and hence the order of occurrence of cultural complexes using different types in this region. It may be said, in justification of this hypothesis, that, so far as is known, the sequence of pottery types suggested by the shell mounds gives the correct chronological order wherever these types are known to overlap elsewhere. This order is discussed more in detail in the chapter on pottery.

In many shell mounds in a very superficial zone—about 2 feet thick and usually less—there are to be found burials of bodies extended in the flesh which are accompanied by shell-tempered pottery vessels. This custom is quite different from the remainder of the mound, and the skeletons reveal a different physical type, as discussed in the chapter on physical anthropology. These burials are definitely intruded into the top of the old midden, and these people probably added but little to its height as their occupancy seems not to have been long continued. Also it may well be that for them shellfish were not nearly so important an item in their diet. This, then, is the exception to a continuous development of a single people on these sites. The shell-tempered pottery users are evidently late comers into the valley and present a separate problem of classification to be discussed later.

Thus, these great middens seem to represent a continuous development of a river people much given to fishing and somewhat less to hunting, who left no evidence of any disposition toward agriculture, and who changed their customs and technique as knowledge grew and opportunities were offered. One might suspect that because they lived on the bank of a river, a great highway of their day, they would have had abundant opportunity to contact strangers and travelers and thus gain knowledge of new materials and techniques. It would seem reasonable, in view of the very slow development of material culture on the shell middens, to suspect that the most important advances were due to importation of ideas and material from the outside rather than to inventions and development within their cultural horizon. The use of the atlatl and heavy dart point seems demonstrated. There is no evidence of the use of the bow and arrow until the advent of the shell-tempered pottery people, late in the history of the mounds.

Although the history of all shell mounds in the basin has probably been similar, it has not been identical. In the main, the general stratigraphy is similar, though in some sites there may be a complete absence of some important trait or a complete shift in relative position of some custom. Thus, the bone projectile points in Lu° 59 and Lu° 61 are in the pottery zone instead of being below and separate from it as in other sites. In Lu° 67 there were no burials classified at the time of excavation as "sitting burials." This site was one of the first shell mounds excavated, and this burial type had not been set up as a separate type at that time. If any burials should have been so classified certainly they were very few and so badly slumped as to have escaped notice as a special form. Burial 66 shown in plate 217, figure 1, Lu° 67, may be such a burial. These variations are perhaps to be ascribed to discontinuities in occupancy of some sites at certain periods, but hardly to the advent of an entirely new population. The only exception to this seems to be the intruded, superficial, extended burials with shell-tempered pottery which certainly represents a very late and distinctly different people.

The major results of the excavations of any shell midden may be presented by constructing an average profile for the site. This idealized profile is not necessarily correct at any particular point, but it is designed to represent an average condition over the whole site. Experience has shown that in shell mounds the results of two separate excavations in the same large shell midden may differ as much as the results of excavations in two different sites. This points to the difficulty of attempting to "integrate" knowledge over a shell mound of considerable size and creates a reasonable doubt as to the possibility of obtaining great accuracy by such procedure. Nevertheless, if one desires to compare the stratigraphy of one site with another, it is necessary to determine profiles which represent the conditions at each site as nearly as they are known. In figure 99 an attempt has been made to show graphically, by ideal profiles from five sites, something of the similarities and differences of the shell mounds of the basin. The base of the pottery zone has been arbitrarily taken to be the horizontal. It is, of course, quite impossible to prove that pottery began to be used on all sites at the same time. It probably did not. That is, the difference in concentration of different types of pottery may suggest as varied a history for the shell middens. It is obviously quite impossible to say that all shell middens are equally old, or that they were abandoned at the same time. Yet the comparison of these profiles from five sites which had considerable excavations in them does present many similarities.

In order to understand the life of the shell-mound dwellers and to characterize their culture prior to the use of pottery, a list of traits has been prepared. Table 43 is a list of traits which seem to present the outstanding customs, as revealed by excavations, and to show a fairly close correlation between sites, where excavations have been extensive. Where sites show a low correlation to the total complex, it is in every case a site where excavations were limited by lack of time or by floods or by labor supply. In every case, extensive excavations have tended to show a homogeneity in the complex—which is taken to mean that all shell-mound dwellers were basically the same people who developed their culture from simple beginnings to a much higher level during the long history of the shell middens.

An inspection of this trait list reveals a relatively high correlation of most of these sites with the total complex. That is, the complex of traits, as expressed by this list, is fairly homogeneous and definite.

When one seeks historic or ethnological connection for this complex, it seems impossible to find. The Shell Mound dwellers were wholly within the prehistoric period and so early as to place most of their occupancy in the nonpottery period. There are known, at present, no other sites in the general vicinity with which the shell mounds on the Tennessee are comparable. The nearest cultural similarities seem to lie with shell-mound habitation sites on Green River, Ky. Many of these Kentucky middens are not only prehistoric but wholly nonpottery as no pottery occurs on them at any level. Some of these Kentucky middens are now (1939) being investigated, but some time must yet elapse before comparison of the two areas can be made complete. A preliminary inspection, however, reveals a general similarity between the shell midden on Green River, Ky., and the middens on the Tennessee River in Alabama.

TABLE 43.—*Traits of the nonpottery dwellers on shell mounds in Pickwick Basin*

Traits	Pickwick Basin site						
	Lu° 67	Lu° 59	Lu° 25	Ct° 27	Lu° 61	Lu° 72	Lu° 5
General traits:							
1. Shell mounds adjacent to shoals in river	×	×	×	×	×	×	×
2. Shell mounds as habitation sites	×	×	×	×	×	×	×
3. Clay floors showing occupations	×	×	×	×	×	--------	--------
4. Fire areas on occupation level	×	×	×	×	×	--------	--------
5. Scattered post molds on occupation level	×	×	×	×	×	--------	--------
6. River pebbles, broken by heat in midden	×	×	×	×	×	×	×
7. Concentration of flint chips, shop site	×	--------	×	×	×	×	--------
8. Fire basins floored with stones	--------	×	×	×	--------	--------	--------
9. Domestication of dog	×	×	×	×	×	--------	--------
Burial traits:							
10. Burials in shell mounds	×	×	×	×	×	×	×
11. Burials usually without artifacts	×	×	×	×	×	×	×
12. Sitting posture burials	×	×	×	×	×	×	×
13. Round-grave burials in pits	×	×	×	×	×	×	--------
14. Flexed burials not in pits	×	×	×	×	--------	--------	--------
15. Partially flexed burials	×	×	×	×	×	×	×
16. Deposit of cremated remains	×	×	×	×	--------	--------	--------
17. Extended to knees, lower limbs folded	×	×	×	×	×	--------	--------
18. Headless burials	×	×	×	×	--------	×	--------
19. Dog burials in midden and in human graves	×	×	×	×	--------	--------	--------
20. Burial offerings most frequent with children	×	×	×	×	×	--------	--------
21. Burials face downward	×	×	×	×	--------	--------	--------
Stone traits:							
22. Atlatl weights, prism type	×	--------	×	--------	--------	--------	×
23. Atlatl weights, expanded center	×	--------	--------	--------	--------	--------	--------
24. Atlatl weights, boat stone	--------	×	--------	--------	--------	--------	--------
25. Bell pestles	×	×	×	×	×	--------	×
26. Mortars—lapstones or nut stones	×	×	×	×	--------	--------	--------
27. Stone beads, long cylindrical	×	×	×	×	×	--------	--------
28. Stone beads, barrel shaped	×	×	×	--------	×	--------	--------
29. Circular hammerstones	×	--------	--------	--------	×	×	--------
30. Fully grooved axes	--------	×	×	×	--------	×	×
31. Stone gorgets, 2-holed slate	×	×	×	--------	×	×	×
32. Sandstone or steatite vessel sherds	--------	×	×	--------	×	--------	--------
33. Tubular pipes, bell shaped	--------	--------	×	--------	--------	--------	×
34. Long ovate flint blades, unnotched	×	×	×	×	×	×	×
35. Long slender projectile points	×	×	×	×	×	×	×
36. Wide-stemmed form, long barbs	×	×	×	×	×	×	×
37. Flint drills	×	×	×	×	×	×	×
Bone traits:							
38. Bone bodkins	×	×	--------	×	--------	×	--------
39. Deer ulna awls	×	×	×	×	×	--------	--------
40. Cannon-bone awls, deer	--------	×	--------	×	--------	--------	--------
41. Splinter bone awls	×	×	×	×	--------	--------	--------
42. Tibiotarsal awls of turkey	×	×	×	×	--------	--------	--------
43. Artifacts made from human bone	×	×	--------	×	--------	--------	--------
44. Antler drifts	×	×	×	×	×	×	--------
45. Antler shaft straighteners	×	×	×	×	--------	×	--------
46. Atlatl hooks	×	×	×	×	×	--------	--------
47. Bone projectile points, one heavy end	×	×	×	×	×	×	×
48. Antler spear points	×	×	×	×	×	×	×
49. Fishhooks from deer toe or other bone	×	×	×	×	×	×	--------
50. Perforated canine teeth	--------	--------	--------	--------	--------	×	--------
51. Hairpins, bone	×	×	×	×	--------	--------	×
52. Needles, cylindrical, from deer bone	×	×	×	×	×	×	×
Shell traits:							
53. Shell pendants, small, triangular	×	×	--------	--------	×	--------	--------
54. Shell-composite Atlatl weight	1	--------	--------	--------	--------	--------	--------
55. Long cylindrical columella beads	×	×	×	×	×	×	×
56. Flat disk beads	×	×	×	×	×	--------	--------
57. *Anculosa* beads	×	--------	×	×	×	--------	--------
Total traits, by sites	50	49	48	47	36	26	21
Percent of total	88	86	84	82	63	45	37

In particular, some of the most unusual artifacts found in these middens are common to both areas. Horn atlatl hooks and stone atlatl weights indicate that the throwing stick was common to both regions. The round-grave burial was used by both; both had domes-

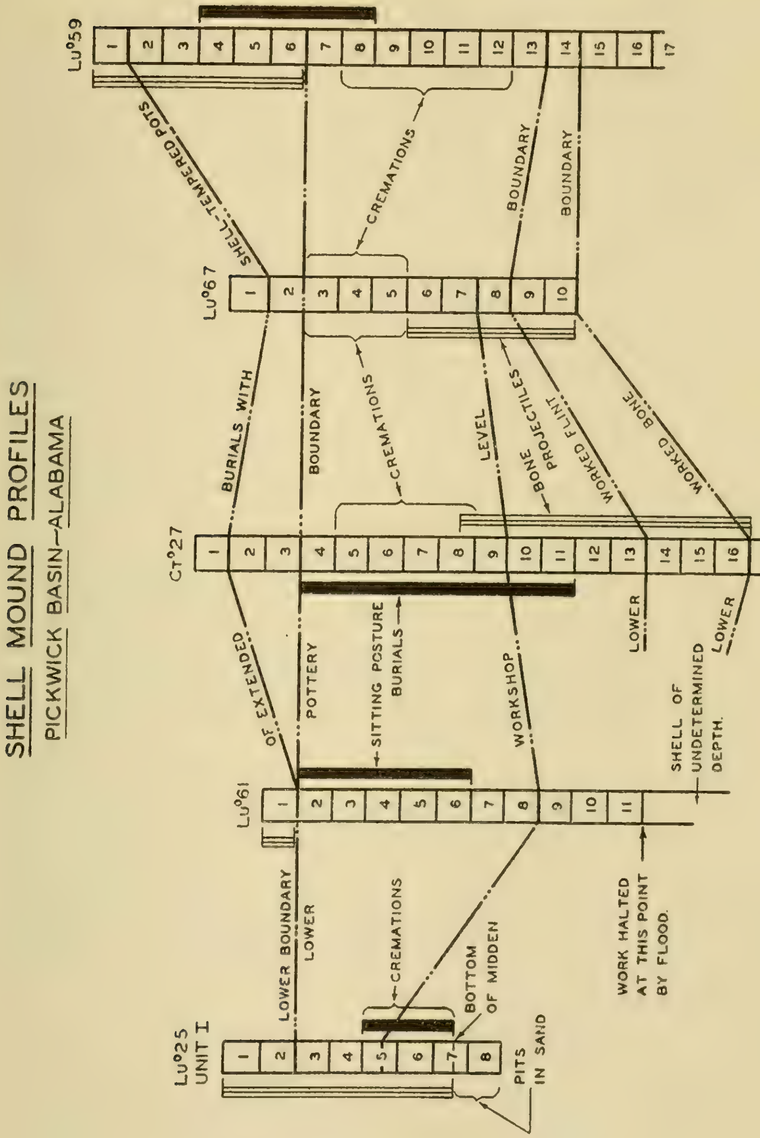
SHELL MOUND PROFILES
PICKWICK BASIN—ALABAMA
Lu°59
SHELL-TEMPERED POTS
CREMATIONS
BOUNDARY
BOUNDARY
Lu°67
BURIALS WITH
BOUNDARY
CREMATIONS
LEVEL
BONE PROJECTILES
WORKED FLINT
WORKED BONE
Ct°27
OF EXTENDED
POTTERY
SITTING POSTURE BURIALS
WORKSHOP
LOWER
LOWER
SHELL OF UNDETERMINED DEPTH.
Lu°61
LOWER BOUNDARY
LOWER
CREMATIONS
BOTTOM OF MIDDEN
WORK HALTED AT THIS POINT BY FLOOD.
Lu°25 UNIT I
PITS IN SAND

FIGURE 99.

ticated the dog, and the burial of dogs in the middens was common.

A most unusual artifact made of plates of shell has been found in both areas. Each plate was nearly triangular in form and centrally drilled with a large hole. A group of 7 to 15 of these plates probably constituted an atlatl weight. This artifact is shown in plate 222, figure 2, site Lu° 67. Similar artifacts were reported by Moore (1916, p. 468) from Indian Knoll, and it has been found to be quite numerous in recent excavations on Green River, Ky. (Webb and Haag, 1939). Such similarities in artifacts and customs definitely suggest connection between these separate areas and may suggest contemporary occupancy. Such superficial observation of apparent similarities between the shell mounds of the two regions has suggested a comparison of traits so far as they are known. By a careful study of the report of Moore on Indian Knoll (designated "Ohio 2" in the Kentucky survey) it was possible to obtain a trait list for this complex. A report (Webb and Haag, 1939) on the excavation of a shell mound on Green River, Ky., site "Ohio 1," provided a second trait list, and a study of material in the laboratory recently received from excavations of a third site, "McLean 11," a shell mound on Green River, provided a third list of traits from a Kentucky shell mound. With this data a comparison is possible.

From the trait list, table 43, four sites were selected, Lu° 67, Lu° 59, Lu° 25, and Ct° 27, as representative of the shell-mound complex. The other three sites were omitted from this comparison, not because they were not typical of this complex, but because excavation on them was quite incomplete. Their relatively low correlation to the total complex is due entirely to insufficient investigation, as experience has demonstrated.

The traits from the four selected sites from table 43 have been rearranged in table 44 in the order of the frequency of their occurrence in order to determine what traits are most basic in this complex. By this rearrangement of these 57 traits of this complex, it is revealed that 39 traits occur on all four sites and, therefore, may be regarded as constituting a focus of this complex. The identity of these 39 traits is obvious from table 44. For purpose of discussion this focus may be designated the Lauderdale Focus.

In table 44, in parallel columns with the data on the four sites of the Lauderdale Focus, there has been indicated the occurrence of these traits in the three Kentucky sites on Green River referred to above. It is to be noted that quite a number of the Alabama traits occur on the Kentucky sites. In order to complete the trait list for the Green River sites, it is necessary to add 19 traits to this list which in turn do not occur on any Tennessee River site. These last traits have been numbered from 1′ to 19′ inclusive, the (′) being used to differentiate these traits from traits in the Lauderdale Focus.

TABLE 44.—*Rearrangement of traits of the shell-midden dwellers of Pickwick Basin to determine those traits most basic as revealed by four Alabama sites, and a comparison with traits found at three Kentucky sites on Green River*

Traits	Pickwick Basin site				Green River, Ky., site		
	Luᵒ 67	Luᵒ 59	Luᵒ 25	Ctᵒ 27	Oh 1	Oh 2	McL 11
1. Shell mounds adjacent to shoals in river	×	×	×	×	--------	--------	--------
2. Shell mounds as habitation sites	×	×	×	×	×	×	--------
3. Clay floors showing occupation	×	×	×	×	--------	--------	--------
4. Fire areas on occupation level	×	×	×	×	×	--------	×
5. Scattered post molds on occupation level	×	×	×	×	--------	--------	--------
6. River pebbles, broken by heat, in midden	×	×	×	×	×	×	×
9. Domestication of dog	×	×	×	×	×	×	×
10. Burials in shell mounds	×	×	×	×	×	×	--------
11. Burials usually without artifacts	×	×	×	×	×	×	×
12. Sitting-posture burials	×	×	×	×	--------	--------	--------
13. Round-grave burials in pits	×	×	×	×	×	×	×
14. Flexed burials not in pits	×	×	×	×	×	×	×
15. Partially flexed burials	×	×	×	×	×	×	×
16. Deposit of cremated remains	×	×	×	×	--------	--------	--------
17. Extended to knees, lower limbs folded	×	×	×	×	×	×	×
18. Headless burials	×	×	×	×	--------	--------	--------
19. Dog burials in midden and in human graves	×	×	×	×	×	×	×
20. Burial offerings most frequent with children	×	×	×	×	--------	--------	--------
21. Burials, face downward	×	×	×	×	--------	--------	--------
25. Bell pestles	×	×	×	×	×	×	×
26. Mortars—lapstones, or nut stones	×	×	×	×	×	×	×
27. Stone beads, long cylindrical	×	×	×	×	×	×	×
34. Long ovate flint blades, unnotched	×	×	×	×	×	×	×
35. Long slender projectile points	×	×	×	×	--------	--------	--------
36. Wide stemmed form, long barbs	×	×	×	×	×	×	--------
37. Flint drills	×	×	×	×	×	×	×
39. Deer ulna awls	×	×	×	×	×	×	×
41. Splinter bone awls	×	×	×	×	×	×	×
42. Tibiotarsal awls of turkey	×	×	×	×	×	×	×
44. Antler drifts	×	×	×	×	×	×	×
45. Antler shaft straighteners	×	×	×	×	--------	--------	--------
46. Atlatl hooks	×	×	×	×	×	×	×
47. Bone projectile points, one heavy end	×	×	×	×	--------	--------	--------
48. Antler spear points	×	×	×	×	×	×	×
49. Fishhooks from deer toe or other bone	×	×	×	×	×	×	×
51. Hairpins, bone	×	×	×	×	--------	--------	×
52. Needles cylindrical, from deer bone	×	×	×	×	×	×	×
55. Long cylindrical columella beads	×	×	×	×	×	×	×
56. Flat disk beads	×	×	×	×	×	×	×
7. Concentration of flint chips, shop site	×	--------	×	×	--------	--------	--------
8. Fire basins floored with stones	--------	×	×	×	--------	--------	--------
28. Stone beads, barrel shaped	×	×	×	--------	×	×	--------
30. Fully grooved axes	--------	×	×	×	×	×	×
31. Stone gorgets, 2-holed, slate	×	×	×	--------	--------	--------	--------
38. Bone bodkins	×	×	--------	×	--------	--------	--------
43. Artifacts made from human bone	×	×	--------	×	--------	--------	--------
57. *Anculosa* beads	×	--------	×	×	×	×	×
22. Atlatl weights, prism type	×	--------	×	--------	×	×	×
29. Circular hammerstones	×	--------	--------	×	×	×	×
32. Sandstone or steatite vessel sherds	--------	×	×	--------	--------	--------	--------
40. Cannon-bone awls, deer	--------	×	--------	×	×	×	×
53. Shell pendants, small, triangular	×	×	--------	--------	--------	--------	--------
23. Atlatl weights, expanded center	×	--------	--------	--------	--------	--------	×
24. Atlatl weights, boat stone	--------	×	--------	--------	--------	--------	--------
33. Tubular pipes, bell shaped	--------	--------	×	--------	--------	--------	--------
54. Shell-composite atlatl weight	1	--------	--------	--------	×	×	×
50. Perforated canine teth	--------	--------	--------	--------	×	×	×
Additional traits from Green River sites:							
1′. Use of red ochre in graves	--------	--------	--------	--------	×	×	×
2′. Terrapin carapace in graves, "rattles?"	--------	--------	--------	--------	×	×	×
3′. Deposit of broken artifacts in graves	--------	--------	--------	--------	×	×	--------
4′. Atlatl weights, winged banner stone	--------	--------	--------	--------	×	×	×
5′. Atlatl weights, subrectangular bars	--------	--------	--------	--------	×	×	×
6′. Pestles, cylindrical, long	--------	--------	--------	--------	×	×	×
7′. Flint points, large, rough triangular	--------	--------	--------	--------	×	×	×
8′. Thumbnail scrapers, stemmed	--------	--------	--------	--------	×	×	×
9′. Thumbnail scrapers, end and side form	--------	--------	--------	--------	×	×	×
10′. Beads, stone disks	--------	--------	--------	--------	--------	×	×
11′. Stemmed-bone projectile points	--------	--------	--------	--------	×	×	×
12′. Perforated bone awls	--------	--------	--------	--------	×	×	×
13′. Forked implement, ulna of deer	--------	--------	--------	--------	×	--------	×
14′. Forked implement, bone splinter	--------	--------	--------	--------	×	--------	×
15′. Bone tubes, long cylindrical	--------	--------	--------	--------	×	×	×

TABLE 44.—*Rearrangement of traits of the shell-midden dwellers of Pickwick Basin to determine those traits most basic as revealed by four Alabama sites, and a comparison with traits found at three Kentucky sites on Green River*—Continued

Traits	Pickwick Basin site				Green River, Ky., site		
	Lu° 67	Lu° 59	Lu° 25	Ct° 27	Oh 1	Oh 2	McL 11
16′. Perforated bone tubes, "whistles"	--------	--------	--------	--------	--------	×	×
17′. Perforated conch-shell sections	--------	--------	--------	--------	×	×	×
18′. Shell pendants cut in arc	--------	--------	--------	--------	×	×	--------
19′. Perforated mussel shell	--------	--------	--------	--------	×	×	×
Total traits	50	49	48	47	52	51	50
Percent of total	88	86	84	82	93	91	89

An inspection of the trait list of these three Kentucky sites reveals a total of 56 traits in the complex and shows that 43 are common to all three sites. Since 13 of these traits do not occur on the Tennessee River, one may be warranted in regarding these 12 traits as diagnostic of a focus, which for convenience may be designated as the Indian Knoll Focus.

From table 44 it may also be observed that of the 57 traits in the Tennessee River Complex, 39 are common to all 4 sites, and, therefore, constitute the list of focus traits, yet 11 are diagnostic of the Lauderdale Focus, leaving 28 focus traits of broader occurrence than the Lauderdale Focus.

In the same way, it may be observed that of the 43 focus traits on Green River, only 13 are diagnostic, leaving 30 traits of broader occurrence than the Green River Focus. If one compares these 28 traits from Tennessee River Focus with the 30 traits from the Indian Knoll Focus, it is found that 23 of these traits are common to all sites in both foci, and might, therefore, be regarded as aspect traits. A relisting of these groups of traits may clarify the classification.

Traits diagnostic of the Lauderdale Focus

1. Shell mounds adjacent to shoals in river.
3. Clay floors showing occupation.
12. Sitting posture burials.
16. Deposit of cremated remains.
18. Headless burials.
20. Burial offering most frequent with children.
21. Burials face downward.
35. Long slender projectile points.
45. Antler shaft straighteners.
47. Bone projectile points, one heavy end.

Total, 10 traits.

Traits diagnostic of the Indian Knoll Focus

1′. Use of red ochre in graves.
2′. Terrapin carapace in graves, "rattles?"
4′. Atlatl weights, winged banner stone.
5′. Atlatl weights, subrectangular bars.
6′. Pestles, cylindrical, long.
7′. Flint points, large, rough triangular.
8′. Thumbnail scrapers, stemmed.
9′. Thumbnail scrapers, end and side form.
11′. Stemmed bone projectile points.
12′. Perforated bone awls.
15′. Bone tubes, long cylindrical.
17′. Perforated conch-shell sections.
19′. Perforated mussel shell.
Total, 13 Traits.

Aspect traits common to all sites in both foci

6. River pebbles, broken by heat, in midden.
9. Domestication of dog.
11. Burials usually without artifacts.
13. Round-grave burials in pits.
14. Flexed burials, not in pits.
15. Partially flexed burials.
17. Extended to knees, lower limbs folded.
19. Dog burials in midden and in human graves.
25. Bell pestles.
26. Mortars—lapstones, nut stones.
27. Stone beads, long cylindrical.
34. Long ovate flint blades, unnotched.
37. Flint drills.
39. Deer ulna awls.
41. Splinter bone awls.
42. Tibiotarsal awls of turkey.
44. Antler drifts.
46. Antler atlatl hooks.
48. Antler spear points.
49. Fishhooks, bone.
52. Needles, bone, cylindrical.
55. Long cylindrical columella beads.
56. Beads, flat disk, shell.
Total, 23 traits.

If it be admitted that there has been produced sufficient evidence to warrant the establishment of two focii (the Lauderdale Focus in Alabama and the Indian Knoll Focus in Kentucky) of this shell-mound complex, then the common traits may justify the designation of an aspect. It is suggested that this aspect be called Pickwick. It appears that, in the case of these Shell Mound people, their great dependence on the river operated as a powerful influence in determining their mode of life. The fact that they lived on the immediate river bank on the shell midden made them a river people. As already discussed, the river provided many forms of food. Their dwellings marked by clay floors and fire-burned areas, were indeed very simple. So transient were such structures that only a few scattered post molds remain, showing no pattern. This riparian life is quite distinct from that of later peoples living in the valley. These people living on the shell middens seemed to have had no need for protection for their homes. They dwelt in the most exposed portions of the valley on middens close by the river. Later peoples placed their villages in protected positions and often built stockades about them. These river people seem to have had no need for such protection. They doubtless had canoes as a simple means of travel on the river. It is hard to believe that they penetrated the dense swamps, canebrakes, or forests very far inland when river travel would suffice to reach their friends and kindred up or down the river. Perhaps during their occupancy they were the only people on the river. In any case, the riparian character of their culture is its outstanding quality. Their great dependence on the river for food is obvious. Beside the fish and shellfish remains, they had turtles, river fowls, and small mammals which frequented the river bank. They had deer in some quantity, but the bones of buffalo and elk are absent in these middens.

Since this culture complex is so dissimilar to all others known to exist in the southeastern United States and presents such a body of evidence pointing to considerable antiquity, it appears desirable to set up a culture pattern to designate this nonagricultural, nonpottery complex and to indicate its primitive beginnings and the simplicity of its organization. This semisedentary people were certainly in a hunter-fisher-collector stage of culture which, in part, may very well designate their culture pattern.

While there is no evidence of any use of agriculture to supplement their hunter-fisher activities, there is some evidence of the use of storage bins in the midden heap, which may suggest the gathering and storage of nuts, roots, and seeds used as food. There is very little evidence of the manufacturing arts, no ceramics and few if any textiles, although the absence of textiles in the shell middens does not necessarily prove them nonexistent. There is no evidence of even semipermanent house structures. Evidence of long distance commerce and trade is lacking. Copper, mica, and obsidian are entirely absent and marine shells are represented in cylindrical beads and gorgets. Large conch-shell cups are absent in the shell-mound complex although they are quite common on shell mounds in the pottery zone of later peoples.

Their whole social economy seems developed around the collecting of food of whatever kind was available. The process of collecting vegetable food is but little different, fundamentally, from their fishing in some ways. The gathering of shellfish is, after all, a form of collecting.

They seem to have lived upon Nature's bounty, collecting and bringing upon the midden many other things they needed besides food. These included river pebbles for fire stones; clay for use as floors for dwellings; and flint, bone, and antler for the making of crude projectiles. Every activity presented by their culture pattern as revealed by these investigations seems centered in *accumulating by collecting* whatever they needed.

In a recent report on a trait list for certain nonpottery sites in Kentucky (Webb and Haag, 1940), attention was called to the similarity between the cultural complex of these Kentucky sites and that of the Lamoka Lake Site of New York as reported by Ritchie (1932).

Since the first report of a nonpottery site in New York, other such sites have been investigated and a Lamoka Focus has been established. While it has not been possible to develop a complete, taxonomic classification for this complex, Ritchie has (1938) designated this pattern as Archaic, partly on a basis of stratigraphy and because of the absence in the complex of agriculture and pottery.

Because it now appears that this nonagricultural, nonpottery, hunter-fisher-collector pattern of culture may have been widespread in the eastern United States in early aboriginal times, the term "Archaic" is here adopted to designate this pattern manifestation in Kentucky and Alabama. Thus, a suggested cultural classification of the Shell Mound dwellers may be indicated as follows:

- Pattern: Archaic.
  - Phase: (Unknown).
    - Aspect: Pickwick.
      - Focus: Lauderdale (Alabama).
        - Components: Long Branch, site Lu° 67.
          Bluff Creek, site Lu° 59.
          Perry Site, site Lu° 25.
          Mulberry Creek, site Ct° 27.
      - Focus: Indian Knoll (Kentucky).
        - Components: Chiggerville, site Oh 1.
          Indian Knoll, site Oh 2.
          Ward Site, site McL 11.

It is not to be supposed that this tentative suggestion is to be regarded as final. As excavation continues and information increases, this very interesting culture complex will be much better understood. Thus a reworking of these lists of cultural traits may lead to a different arrangement of traits regarded as diagnostic of the various subdivisions.

DOMICILIARY EARTH MOUNDS AND VILLAGES

This group of domiciliary earth mounds and villages present a very interesting complex of traits. This occupancy is believed to be the most recent of any of the prehistoric period, and it seems possible that these people may have left descendants to the historic period.

In this basin this complex is represented by three sites: Seven-Mile Island, Lu° 21; McKelvey Mound, Hn° 1; and Koger's Island, Lu^{v} 92. The first two of these were domiciliary earth mounds and the last was a village and cemetery. As pointed out in the conclusions following each of these site descriptions, there are several components presented in the occupancy of each site. Thus, each of these sites has had a somewhat different history, yet, in broad outline they are quite similar.

Each site began as a village made by people who used clay-grit-tempered pottery. Some of these villages showed considerable use of shellfish for food, and many of the customs common to the pottery zones of shell middens are found here. Where it has been possible, because of stratigraphy, to separate the artifact of this early component from the later component at any site, this early component seems to fall completely within the range of the pottery-using shell-mound group.

The clay-grit-tempered sherds are quite similar in all respects to the clay-grit sherd from pottery zones in the top of shell mounds. The horn and bone artifacts are similar, and where it has been possible to distinguish, the burial customs are in accord. These people did not use clay-grit-tempered pottery exclusively, but a small and relatively insignificant amount of fiber and sand-tempered sherds appears, as in the shell-mound pottery zones. It therefore does not seem necessary to postulate the existence of another people to account for the first component of each of these sites.

A study of the later component of these sites has revealed an increasing number of similar traits, most of which have previously been reported from Moundville as has been indicated in the report of each site. While these similarities point to certain southern connections and affiliations with Moundville, the degree of relationship is not easy to determine. This is due in part to the fact that Moundville has yielded a great number of very unique cultural traits which have become justly celebrated as evidence of a very high cultural level for these people. So beautiful is the engraved black pottery, so careful the delineation of their art motifs, and so well executed is their work in stone, shell, and copper, that the literature so far available on Moundville abounds in illustrations of these higher manifestations of their culture pattern. However, sites on the Tennessee River do not present evidence of a cultural complex so highly developed and it is difficult, therefore, to make any adequate comparison with the Moundville culture pattern. However, it is possible to compare these three sites on the Tennessee River with each other, first, by excluding from each site those traits believed to belong to the earliest occupancy (the clay-grit pottery shell-mound dweller) and then by preparing a list of traits of the remaining complex from each site.

This has been done in the following tabulation. In this trait list, the occurrence of any specific trait at Moundville has been noted without attempting a characterization of Moundville culture herein.

TABLE 45.—*Traits of the Moundville-like components of domiciliary earth mounds and villages, and traits from the intruded component on three shell middens, combined*

Traits	Pickwick Basin site						Occurrence at Moundville
	Lu^v 92	Hn^o 1	Lu^o 21	Lu^o 59	Lu^o 25	Ct^o 27	
General traits:							
Burial on sites occupied by earlier people	×	×	×	×	×	×	×
Post molds in occupation levels	×	-------	×	-------	-------	-------	×
Fire-burned areas	×	×	×	×	×	×	×
Wattle work, bricquettes	-------	-------	×	-------	-------	-------	×
Basin-shaped fire hearths	×	-------	×	-------	×	-------	×
Burial traits:							
Single burials, fully extended	19	8	×	10	3	1	×
Single burials, partially flexed	11	-------	×	2	2	3	×
Multiple burials, fully extended	15	-------	-------	-------	24	-------	×
Multiple burials, partially flexed	22	-------	-------	-------	12	-------	×
Burials usually accompanied by artifacts	×	×	×	×	×	×	×
Stone traits:							
Greenstone celts	19	1	5	1	1	-------	×
Flint knives	1	3	-------	-------	-------	-------	×
Spatulate ceremonial ax	1	-------	-------	-------	-------	-------	×
Circular stone disks, notched	3	1	-------	-------	-------	-------	×
Galena balls	1	2	-------	1	-------	-------	×
Triangular arrow points	15	39	4	4	6	-------	×
Long slender stemmed projectile points	5	-------	-------	-------	1	-------	-------
Cache of small pebbles in grave	2	-------	-------	-------	-------	-------	×
Stone pendant	-------	-------	1	-------	-------	-------	×
Bone traits:							
Cylindrical bone needles, ends often beveled	20	9	-------	1	3	-------	-------
Tibiotarsus awls of turkey	12	3	-------	-------	4	1	×
Perforated canine teeth of animals, strings	3	-------	-------	-------	-------	2	×
Bird sternum pendants of rattles	27	-------	-------	-------	-------	-------	×
Antler projectile points, conical, barbed	32	-------	-------	-------	5	-------	×
Shell traits:							
Marine shells as cups	3	-------	-------	-------	1	1	×
Shell cups ceremonially "killed"	3	-------	-------	-------	-------	1	×
Marine shell gorgets, plain, two holes	2	-------	-------	2	-------	1	×
Shell gorgets sun-cross-square design	1	-------	-------	-------	-------	2	×
Mussel-shell hoes	3	-------	-------	-------	-------	-------	×
Columella shell heads, round, small	3	-------	-------	1	5	1	×
Columella shell heads, 1-inch diameter	9	-------	-------	-------	14	-------	×
Olivella shell bead, strings	1	-------	-------	1	-------	-------	×
Pearl beads	1	-------	-------	-------	-------	-------	×
Shell spoons	-------	-------	-------	-------	2	-------	-------
Copper traits:							
Thin copper pendants, duplicate embossed	8	-------	-------	-------	-------	-------	×
Pendants embossed with cross design	6	-------	-------	-------	-------	-------	×
Pendants embossed with eye design	2	-------	-------	-------	-------	-------	×
Circular embossed ear ornaments on wood	4	-------	4	2	-------	-------	×
Copper beads	-------	-------	-------	×	-------	-------	×
Pottery traits:							
All pottery vessels shell-tempered	×	×	×	×	×	×	×
Vessels put at head and foot of grave	×	×	×	×	×	×	×
Small vessels often put in graves	×	-------	×	-------	2	3	×
Very large utility vessels	×	-------	-------	-------	×	3	×
Two- and four-strap handles on pots	×	×	×	×	×	1	×
Two-loop handles on pot	×	×	×	×	×	-------	-------
Pot with raised rims at handles and rows of bosses following rim or shoulder	×	-------	-------	-------	-------	-------	×
Open bowls, heading below rim	×	-------	-------	-------	×	-------	×
Water bottles, plain, coarse shell temper	×	-------	×	-------	-------	×	×
Water bottles, black, fine shell temper, plain	1	-------	-------	-------	-------	-------	×
Water bottles, engraved flying serpent	1	-------	1	-------	-------	-------	×
Water bottles, engraved hand eye design	1	-------	-------	-------	-------	-------	×
Water bottles, engraved eagle	-------	-------	-------	-------	1	-------	×
Water bottles, engraved fine parallel lines about circular depressions	2	-------	1	-------	1	-------	×
Pottery-pipe square section, elbow	-------	-------	1	-------	-------	-------	×
Pottery-pipe dog effigy	1	-------	-------	-------	-------	-------	×
Total traits, 56	49	15	21	18	27	18	50

Further, as has been pointed out in many shell mounds, there have been observed shallow burials intruded from the surface. Many of these burials show individual traits, which are foreign to the shell-mound complex, and which have been found at Moundville. It would appear, therefore, that not only on these three sites are found many traits common to Moundville, but that these traits are found scattered broadly in other sites in the basin. In nearly every case, these other sites are the result of a late intrusion into a shell mound. Such intrusions are rarely very great in number, yet they probably suffice to show that some time after the close of the Shell Mound building, a people having many of the simpler and less spectacular traits of Moundville became dominant in this basin. These people lived on many sites previously occupied by the earlier Shell Mound people, and had important centers of occupation at the three sites under consideration.

This trait list for these sites is so incomplete that a comparison with the total complex at Moundville would have no meaning. It can show but little beyond pointing definitely to Moundville affiliation for some of the earth mounds on the Tennessee River.

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GEOLOGY OF THE PICKWICK BASIN, IN ADJACENT PARTS OF TENNESSEE MISSISSIPPI, AND ALABAMA

By WALTER B. JONES
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GEOLOGY OF THE PICKWICK BASIN, IN ADJACENT PARTS OF TENNESSEE, MISSISSIPPI, AND ALABAMA

By Walter B. Jones
State Geologist of Alabama

INTRODUCTION

For the second of a series of archeological reports (Webb, 1939) on the Tennessee Valley impoundments by the Tennessee Valley Authority, the writer prepared a short account of the geology of that part of the valley in Alabama. The present paper is intended to be a little more detailed than the first one, and includes small areas in both Mississippi and Tennessee, although most of the basin is in Alabama.

GEOLOGY

The entire Pickwick Basin is located in a region of essentially flat-lying beds of Cretaceous, sub-Carboniferous (Mississippian) and Devonian(?) age, little disturbed by folding, but characterized by a slight dip to the southward and westward. The Mississippian beds dip underneath the Cretaceous sediments of the Mississippi embayment, while outliers of Cretaceous (Tuscaloosa formation) occupy the higher ridges between principal drainage valleys. The floors of the valleys are invariably composed of Paleozoic beds, from which the unconsolidated sediments of the Cretaceous were doubtless removed by erosion. In this area, the fall line is indistinct. Pickwick Dam is located in the region of the average fall line but actually it rests on fossiliferous, siliceous limestones of Devonian age. In the upper part of the basin, the Tuscumbia limestone outcrops over most of the area while the Lauderdale chert is prominently exposed in the lower part.

The stratigraphic column is as follows:

Age	Formation	Thickness	Characteristics
		Feet	
Cretaceous	Selma	100	Calcareous clay, some green sand, micaceous.
	Eutaw	300	Cross-bedded sands, clays, red and purplish to light gray, some green sand, micaceous.
	Tuscaloosa	100	Sand, gravel, and clays.
UNCONFORMITY			
Mississippian	Bangor	500	Massive, coarse to fine semicrystalline limestone, blue to gray, cherty and abundantly fossiliferous.
	Hartselle	225	Coarse to medium-grained sandstone, light gray, massive to thin-bedded, individual grains sharp and angular.
	Golconda, Cypress.	0–80	Limestone, sandstone, shale, and marl, fossiliferous in part.
	Gasper	100	Oolitic limestone, in part asphaltic, and shale, fossiliferous, becoming more shaly to the westward.
	Bethel	20	Massive, coarse-grained sandstone, in part asphaltic.
	St. Genevieve	100	Marl, shale and thin-bedded limestone, becoming mostly shale to the westward, abundantly fossiliferous, especially at the base.
	Tuscumbia (Warsaw).	200	Limestone to cherty limestone, coarse-grained and thick-bedded, abundantly fossiliferous.
	Lauderdale	200	Chert, cherty limestone, occasional beds of limestone, dark to green shale at base, myriads of fossils especially crinoid stems, thin- to thick-bedded.
UNCONFORMITY			
Devonian	Chattanooga	25	Black, highly fissile shale sandy at the base, the sand member becoming thicker near the dam where it is known as the Hardin sandstone member. Also calcareous, in part, near the dam.

There is considerable variation in the physical characteristics and position of the beds from east to west, particularly in the Mississippian series. For example, the upper part of the series, from St. Genevieve to Bangor, inclusive, is missing in the area near the dam, where Cretaceous sediments rest uncomformably upon the Chattanooga or Warsaw. Also, the limestones of the eastern part of the basin change to calcareous clays and sands near the dam. The Chattanooga shale becomes much thicker to the westward, and near the dam includes sand members. Cherts and cherty limestones of the eastern Mississippian become much less siliceous to the westward. Undoubtedly this latter change had a strong influence upon the habits of the aboriginal occupants of the lower part of the basin. Where the cherts and cherty limestones abounded, the banks of the stream are thickly dotted with shell heaps and mounds. These features decreased in number and size toward the lower end of the basin. It is evident that the gravel (chert) and sand have, as well as the comparatively shallow water caused by the resistant chert layers, produced an ideal habitat for shell life. Likewise the shallow water made it easy for the aborigines to gather their supplies of shellfish. It is also important that many other species of wildlife, most of which the aborigines used to some advantage, found the shallow waters to their liking.

Because of the lateral changes in the formations, they will be described by section.

Eastern section (*from Wilson Dam to Koger's Island*).—This section, entirely in Alabama, occupies about one-third of the length of the basin and has outcrops of Tuscumbia (Warsaw) limestone along both banks of the river, except in the eastern extremity, where the Lauderdale chert sets in. Wilson Dam, next above Pickwick, rests on the Lauderdale. The St. Genevieve, Bethel, and Gasper formations show up near the south bank of the river just west of Tuscumbia, but the river gradually leaves these outcrops farther and farther away, in its northwestward course. The Hartselle approaches the river near Pride and Barton, but is nowhere adjacent to pool level of the lake. The nearest Bangor outcrop is some 8 to 10 miles from the river.

The Tuscumbia and Lauderdale formations are rather regular in this section, and consist of limestones, cherty limestones, and cherts. The Hartselle is likewise regular, in that its characteristic sandstones persist. However, the St. Genevieve changes from limestone to calcareous shales. The principal feature of the Gasper is the massive-bedded, oolitic limestone, which persists throughout the section, as does the underlying sandstone layer of the Bethel. There are several caves in this section, which were occupied by the aborigines. All such caves were leached out of the Tuscumbia limestone.

Nearly all of the beds, except the sandstones, are sparingly to abundantly fossiliferous.

Central section (from Koger's Island to near the Alabama-Tennessee line).—In this section, in Alabama and Mississippi, the banks of the river are entirely in the Lauderdale chert, with Tuscumbia (Warsaw) limestone in the bluffs along the south banks and a few remnants of the same formation near the north bank. In the Bear Creek part of the section, however, the entire Mississippian series shows up, from the Bangor out the headwaters to the Lauderdale at the mouth of the creek. Along Bear Creek both the Cypress and the Golconda show up in several places. It is in this part of the section that the oolitic member of the Gasper and the Bethel sandstone horizon become asphaltic. Most of the upland areas, between principal drainage systems, are covered with a blanket of sand, gravel, and clay of the Tuscaloosa formation. The thickness of this blanket varies up to perhaps 100 feet or more.

In the Mississippi part of the area, the Eutaw and Selma formations are close enough to the pool level to be included in the list, particularly in the vicinity of Yellow Creek. Here, the character of the Mississippian beds has changed so much, that they are hardly recognizable except by their diagnostic fossils and stratigraphic position. Fortunately, fossils are comparatively abundant in most of the beds.

One of the most prominent features of the section is the series of rapids (called Colbert Shoals) at the eastern end of the area, where the Lauderdale chert shows up again in the bed of the river.

Western section.—This section is nearly all in Tennessee, with a few square miles in Alabama and Mississippi. Along west of the river bank, the Lauderdale chert (called Fort Payne by the Tennessee Geological Survey) continues in prominence, although it is supplanted in several places by the Chattanooga shale (and Hardin sand). The Tuscumbia formation comes fairly close to the right bank, but the left bank is almost entirely composed of cretaceous sediments, except for a narrow strip of Lauderdale near the river. The Chattanooga formation becomes a series of horizons, and much thicker. Both the Tuscaloosa and Eutaw formations are exposed on both sides of the river, while the Selma outcrops a few miles to the westward. In the lower part of this section, there is a rather wide area occupied by old river terraces.

EFFECT OF GEOLOGY UPON ABORIGINAL OCCUPATION

As hereinbefore mentioned, the geology of the area had a decided effect upon the aboriginal occupation of the region. Undoubtedly the earliest inhabitants paid more attention to fish, shellfish, and game than to agriculture, and that is certainly verified by the numerous shell deposits along the banks of the limestone-chert portion of the stream. Even later settlements utilized fully the supplies of aquatic foods, finding out at the same time that the flood plain and terraces of the river were ideal places for agricultural pursuit. It is believed that the higher places in the flood plain and all of the terraces were above flood water in aboriginal times and, indeed, most of the shell mounds partially remained out of the water during our modern floods. This certainly enhanced the desirability of such places for permanent settlements.

Another important effect of geology upon aboriginal occupations was the rather numerous caves and bluff shelters which dot the south bank of the river from Pride to and even beyond Colbert Shoals. Many of these places were occupied, and a few evidently were lived in for considerable periods of time. A few of the caves extend far back from the bluffs, but only the outer parts were occupied. Apparently, they preferred natural light to artificial.

The siliceous beds furnished an abundance of material for flint and stone tools, weapons, etc. Shells became the raw materials for beads, gorgets, pendants, and the like. Although raw materials were abundant in the area, it was necessary for them to import such things as copper (for ornaments), galena (for white paint), greenstone (for celts, axes, and tools), and red paint. The river provided an ideal avenue for such commerce. It is difficult to imagine a more desirable environment for primitive peoples. Unquestionably, the geology of the area brought about that favorable situation.

PRELIMINARY REPORT ON MOLLUSKS FOUND IN THE SHELL MOUNDS OF THE PICKWICK LANDING BASIN IN THE TENNESSEE RIVER VALLEY

By J. P. E. MORRISON
Aid in the Division of Mollusks, United States National Museum

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INTRODUCTION

In connection with the archeological research carried out by the Social and Economic Research Division of the Department of Regional Planning Studies of the Tennessee Valley Authority, the writer was asked to make a study of the kitchen-midden type of shell mounds in the Pickwick Landing Basin in Lauderdale and Colbert Counties of northwest Alabama. In December 1937, field work was undertaken, in order to collect a series of the shells in these mounds for the United States National Museum, and to record any faunal changes that may have occurred in this portion of the Tennessee River. Time actually spent in the field was limited to a period of 10 days; this was sufficient, because of the most excellent cooperation shown by the archeologists conducting other studies on Indian sites in the area, and by reason of the literal "handing over" of a crew of about 20 Works Progress Administration laborers, for the amount of excavation incidental to complete sampling of the shell-mound sites.

The kitchen-midden shell mounds are moderately prominent features of the river bank. Located on the ridge at the river's edge of the flood plain, they are as much as 10 feet higher in elevation than the surrounding land. Where the river is eroding its bank, they appear as whitish patches, in contrast to the usual yellowish color of the surrounding soil areas. In the case of the higher mounds, the river sediments have built up the river bank about 5 feet above the base of the deposits, so that a 15-foot deposit of shell appears only about 10 feet higher in elevation. When the forest or grass cover is removed as in plowed fields, or as was the case in this entire area by reason of preparation of the basin, such shell deposits will be exposed on the surface.

The flood-plain soil of the Tennessee River does not long preserve the shells scattered by floods into river-drift deposits, probably because of the presence of acid ground water. Such acid ground waters are indicated by the general feature of land erosion by means of solution in this limestone area, with the attendant features, caves and large springs. In contrast, the massive accumulation of shells in these kitchen middens has artificially produced small spots on the flood plain in which the soil is alkaline enough to preserve even the thinnest, most fragile molluscan shells. Soil from some of the shell samples taken tested 8.0 on the pH scale. Thus, these minute areas may be considered analogous to loess deposits, although much more recent in time.

Certain of these shell heaps were readily available for sampling, since previous TVA researches on their general features had left vertical sections, usually near the center of the mounds, exposed. Other sites were included, as near the upstream and downstream limits of this group of shell mounds as was made feasible by the limits of transportation of heavy samples, in order to include whatever geographic factors were present in more than 30 miles extent of river. The problems of truck transportation across muddy river bottoms lacking in roads, and of high-water difficulties of regularly working on Seven Mile Island below Tuscumbia, unfortunately prevented the sampling of the mounds at the limits of the area.

Samples of the shells were taken quantitatively, since it was evident from field observation that there was little striking qualitative difference in the species of mollusks present in the different mounds.

One sample was secured from each foot level of the mound to be studied in the following manner: A small shelf along the selected portion of the exposed vertical section was "peeled down" by foot layers. This shelf was cut 5 by 15 feet in the case of the mound at Bluff Creek, site Lu° 59; in the others it was 5 by 10 feet. This size shelf was taken as the minimum space in which the men of the digging crew could quickly and safely take samples from an exposed face as high as 15 feet. The surface was roughly cleared; a sample taken at random from the shelf area was shoveled as carefully as possible into a cardboard carton; the shelf was cleared down to a level 1 foot below the surface; the second sample taken; the shelf completely cut down to 2-foot depth; and so forth until the sand or clay underlying the lowermost deposits was reached.

Each sample consisted of enough material (shell and soil) to fill a carton measuring 9 by 14 by 18 inches. This particular size of carton was used because it was immediately available in unlimited quantity, and proved convenient in boxing the samples for shipment to the United States National Museum, where these studies were pursued. The actual amount of the sample is known to have varied slightly, on account of the difference in compaction of the different soil mixtures encountered. Each sample contained 1.3 cubic feet taken at random from the 50 cubic feet of each foot level excavated in the process. (In the case of site Lu° 59, it was 1.3 out of 75 cubic feet.) In cases where the sampling deviated from the uniform foot levels, this deviation is noted in the description of the work on the individual mounds.

No later restriction of the samples to a volume of 1.0 cubic foot was made, in order that there would not be a doubling of the personal equation involved in random sampling. It is thought inadvisable to reduce the figures on occurrence of individual species to this value, on account of the many fractional numbers it would involve. Since all the samples taken were as nearly uniform as possible at 1.3 cubic feet, the uncorrected occurrence figures will furnish an equally accurate basis for comparisons.

Each sample was water-screened in the laboratory at the Museum, in order to eliminate the soil, steam-cracked rock fragments, and other extraneous material from the shells. This washing process not only "prepared" the shells as specimens, but also materially speeded their identification. Later on, the process was changed in order to save time in the preparation of such a mass of material, to a mixture of wet and dry screening. The first dry screening separated the larger specimens; the water screening was continued to prevent loss of the more minute shells found to be present. Screens with a mesh four to the inch retained practically all of the unionid (mussel) shells eaten during the building of these mounds; screens eight mesh to the inch retained the smaller species of freshwater snails used as food; but the use of fine-mesh screens (24 to the inch) was necessary to recover the smallest species of land snails found to be present incidentally in this material.

In the identification of the species of fresh-water mussels, each valve or recognizable fragment was counted as a specimen, since there was little possibility of matching valves to count as a whole, and there was no way of telling whether each fragment represented a different specimen or if two or three came originally from the same shell. This means of counting is believed to be accurate as far as the proportions of species present are concerned. It is admitted that the count will seem too high in certain cases to pack that large a number of unionids into the space of one sample, and still have any room for the other specimens that came from the same 1.3 cubic foot. On the other hand, with a uniform method of counting, comparisons between different mounds or between the different levels of each mound retain their accuracy.

The count of specimens of the larger fresh-water snails which were used as food does not include small fragments, as these shells were recovered in practically unbroken condition in most of the material, so that "chips," if counted, would change the data on occurrence abnormally. Fragments are included in the count of land snails, in order not to omit many of the larger species, represented usually in broken condition, from the lists.

In the study of these shell mounds, the writer is greatly indebted to the Tennessee Valley Authority for the opportunity to historically study one of the most renowned fresh-water molluscan faunas of the world. The highest degree of cooperation from Maj. William S. Webb, in charge of these archeological researches, and from J. R. Foster, T. Johansen, and B. C. Refshauge, field archeologists working in the Pickwick Landing Basin at the time, contributed materially to the collection of this irreplaceable material.

The Works Progress Administration has made the quantitative study of such a mass of material possible in this brief period, by furnishing laborers to assist in the actual collection of samples in the field, and by furnishing preparators in the United States National Museum (Smithsonian Institution project) to assist in separating, cleaning, and otherwise preparing the material for identification and analysis.

Much has been contributed in the form of helpful suggestions and advice by the writer's immediate superiors in the United States National Museum, Dr. Paul Bartsch and Dr. Harald Rehder.

DESCRIPTION OF MOUNDS STUDIED

Seven of the shell mounds in the Pickwick Landing Basin were sampled; three sites were in the middle of the area, with two others nearer the upstream and two nearer the downstream limits of this group of kitchen middens. While it may be argued that the diversity of these three separate sections of the Tennessee River will tend to obscure the few facts discovered in this preliminary study, it is believed necessary to examine all three spots in order to more clearly evaluate general faunal changes as opposed to local changes caused by edaphic conditions. A brief description of the sites included in this examination follows.

Site Lu° 72.—This is a shell mound, situated about 1 mile downstream from Shell Bank Landing, in the south corner of sec. 5, T. 2 S., R. 15 W., about 4 miles west of Waterloo, Lauderdale County, Ala. Samples were secured December 21, 1937, from all levels to a depth of 6 feet below the surface. The depth of the mound is unknown, as the time allotted to sample taking was insufficient to reach bottom in this mound which had not previously been opened for study.

Site Lu° 70.—Shell Bank Landing, in sec. 9, T. 2 S., R. 15 W., about 3 miles west of Waterloo, Lauderdale County, derives its name from the shell mound which has been used for a landing at this point. Samples were secured from the surface to a depth of 10 feet, which is the bottom of the shell deposit on this site, on December 21, 1937. A zone of heavy or concentrated shell is indicated between 10 and 8 feet. The zone from 8 to 6 feet in depth was sterile sand, and, therefore, not sampled. The levels above 6 feet were a mixture of shell and earth, with the greatest concentration of shell occurring at about the 3-foot level.

Site Lu° 67.—This shell mound is on the river bank opposite Brush Creek Island, in sec. 14, T. 2 S., R. 14 W., a little more than a mile southeast of Wright, Lauderdale County. Although there were two "sterile" zones indicated from previous studies made here, all levels were sampled to the bottom of the site which was at a depth of 10 feet. From 10 to 9 feet there was shell; the sterile clay between 9 and 8 feet proved to be literally a blank, no shells of any species, either freshwater mussels, freshwater snails, or land snails being recovered from the sample taken. There was shell between 8 and 6 feet; the sterile humus layer between 6 and about 4½ feet proved to be almost sterile, only a small number of shells being recovered from these two samples. The heaviest concentration of shell was seen between 4 and 2 feet, with mixed earth and shell in the uppermost layers near the surface.

Site Lu^{v} 62.—This village site was at the mouth of Bluff Creek, at the southwest corner of sec. 18, T. 2 S., R. 13 W., about 3 miles west-southwest of Gravelly Springs, Lauderdale County. Bluff Creek, in its meandering, had cut away a portion of the site and exposed beneath it three layers of shell deposits. The lowest layer was at a depth of about 8 feet, and was so old and/or weathered as to be little more than a layer of chalk a couple of inches thick, containing few recognizable shells. Between 7 and 6 feet there were some shells; 6 to 5 feet was a relatively heavy shell layer; at 2 feet there was a thin layer of concentrated shell, with a scattering of shells in the foot below. The intervening layers were composed of "sterile" clay, which had probably been deposited by the river, as no cross bedding of the clay was seen to indicate its source as from the creek. The soil from 2 feet to the surface was much like the surrounding soil area, with no shell seen at the surface, which was on the margin of a site of later Indian village occupation (not a shell mound occupation).

Site Lu° 59.—This shell mound is situated a little east of the mouth of Bluff Creek, in the southern part of sec. 18, T. 2 S., R. 13 W., about 3 miles west-southwest of Gravelly Springs, Lauderdale County. As one of the largest and thickest of the shell mounds in the area, it had been studied considerably by the archeologists, previous to the time the samples were secured on December 13, 1937, so that there was a complete section near the middle of the mound available for shell sampling. A shelf in sectors 135R4–5 to 150R4–5 was cut down in the process, as the most feasible means of working the 15-foot perpendicular face exposed. The shell was fairly constant from the bottom to about 12 feet, being rather densely distributed in somewhat sandy clay. Twelve to 11 feet had a good deal of clay with fewer shells; from this level up to about 7 feet there were many shells. The greatest concentration of mussel shell at 9 to 8 feet was sampled twice, in order to obtain the greatest number of species possible, and to obtain finer, less fractured specimens. From 7 to about 3 feet the amount of shell was moderate, sometimes in lenses, and mixed with a good deal of humus. A second heavy concentration of shells occurred between the 2- and 1-foot levels, with some pockets, in which the shells seemed to be whole, undisturbed since they were gathered or cooked there, and in which there was little if any soil between the individual shells. Here again, extra sampling was resorted to, in order to get as complete a picture as possible of the conditions under which the shells were gathered for food, as reflected in the species present. The surface layer was proportionately little disturbed, when it is remembered that it was part of a plowed field before these researches were started.

Site Lu° 5.—The mound at Smithsonia Landing is in the northwest portion of sec. 23, T. 3 S., R. 13 W., on the Tennessee River bank just south of the settlement of Smithsonia, Lauderdale County. The layers of shell in this mound sloped somewhat toward the river's edge, but at the point sampled were about 9 feet in total thickness. The lower limit of excavation at this site was 15 feet, so there was no question as to the total depth; the layers exposed beneath being sand with clay at the base. There was a heavy layer of shell at 9 to 8 feet, next a layer of sand that was not sampled, being sterile, then a moderate concentration of shell and sand continued to about the 3-foot level. From that point to the 1-foot level, there was considerable shell, in heavy layers and somewhat in lenses, roughly corresponding to the upper portion of the mound at site Lu° 59.

Site Ct° 27.—This, the only one of the shell mounds on the south side of the Tennessee River that was easily available for this study, lies at the mouth of Mulberry Creek, in sec. 22, T. 3 S., R. 13 W., about 3 miles north of Barton, Colbert County, Ala. The flood plain is narrow here, it being less than one-quarter mile from the mound on the river bank to the beginning of the upland (the edge of the immediate Tennessee River Valley). While the deepest excavations on this site were 19 feet, they included the lowermost layers of shell which sloped downward toward the river, so that the shell mound is actually made up of only 15 feet of deposits, at least in that part studied by the writer. There were two sterile layers of sand in the lower part, with a lot of shell in the lower levels, more or less evenly distributed up to a depth of about 8 feet. The zone in the neighborhood of 8 to 7 feet was particularly dense in shell. At about 6 feet there is a change to loam with scattered shell, which continues to about the 3-foot level, where there are more concentrated shell lenses in evidence. These heavier lenses continue to about the 1-foot layer, where the concentration of shell falls off because of the greater leaching or weathering, and the cessation of the shell deposition a long time ago, without any cessation of the processes of humus or soil accumulation and/or tracking onto the site. For many years this mound at Newport Landing, and the one across the river at Smithsonia Landing (site Lu° 5) were in use as ferry terminals. Since the shells were first deposited here, the Tennessee River has swept a little to the north in its slow meanderings, as evidenced by plane upper shell layers above earlier ones that dip downward toward the river's edge, and now is swinging back, as shown by the somewhat cutaway river side of this site. During this time, Mulberry Creek has continued to flow in its bed alongside the mound with little if any change, as can be seen by the topography, as well as by the presence in site Ct° 27 of a great number of specimens of *Goniobasis acuta* (Lea), of the same form as taken in numbers living in Mulberry Creek, about a half mile from its mouth. These snails were found living in the creek where it was not backed up or ponded by high water of the river.

FRESH-WATER MUSSELS

Table 1 shows the distribution of the species of fresh-water mussels that have been recorded (Ortmann, 1925) or personally collected from this stretch of the Tennessee River, as they were found to be present in the various shell mounds studied. The list is composed of the species from the main river only; those confined to the tributaries and those locally distributed and not found in this limited area are omitted.

TABLE 1.—*Mussel distribution in shell mounds*

Species	Site[1]							
Margaritana monodonta (Say)	[2] R							
Fusconaia ebena (Lea)	R							
subrotunda (Lea)		72	70	67		59	5	27
subrotunda pilaris (Lea)							5	
appressa (Lea)		72	70	67	62	59	5	27
edgariana (Lea)		72	70	67	62	59	5	27
undata trigona (Lea)	R							
plena (Lea)		72	70	67	62	59	5	27
cordata (Raf.)			70	67		59	5	
tumescens (Lea)		72	70			59	5	
Megalonaias gigantea (Barnes)	R							
Amblema costata (Raf.)		72		67		59	5	27
Tritigonia verrucosa (Raf.)	R							
Quaarula fragosa (Conrad)	R							
pustulosa pernodosa (Lea)		72	70	67		59	5	27
intermedia (Conrad)		72	70	67	62	59	5	27
tuberosa (Lea)		72		67	62	59	5	27
biangulata Morrison		72	70	67	62	59	5	27
metanevra (Raf.)		72	70	67	62	59	5	27
cylindrica (Say)		72	70	67	62	59	5	
Cyclonaias tuberculata granifera (Lea)		72	70	67	62	59	5	27
Plethobasus cooperianus (Lea)	R							
cyphyus compertus (Frierson)				67	62	59		27
cicatricoides (Frierson)				67		59	5	
Lexingtonia dolabelloides (Lea)		72	70	67	62	59	5	27
Pleurobema clava (Lam.)		72	70	67	62	59	5	27
holstonense (Lea)		72	70	67	62	59	5	
pyramidatum (Lea)		72	70	67	62	59	5	27
Elliptio crassidens (Lam.)		72				59	5	27
dilatatus (Raf.)		72	70	67	62	59	5	27
Lastena lata (Raf.)	[2] R							
Lasmigona costata (Raf.)						59		
Anodonta grandis Say				67		59		27
Alasmidonta calceola (Lea)						59		
Alasmidonta marginata (Say)						59		
Strophitus rugosus (Swainson)						59		
Ptychobranchus fasciolare (Raf.)		72	70			59	5	27
subtentus (Say)		72	70	67		59	5	
Obliquaria reflexa (Raf.)	R							
Cyprogenia irrorata (Lea)		72	70	67	62	59	5	27
Dromus dromas (Lea)		72	70	67	62	59	5	27
Obovaria retusa (Lam.)		72	70	67		59	5	27
subrotunda globula Morrison		72		67		59	5	27
olivaria (Raf.)	R							
Actinonaias carinata orbis Morrison		72	70	67		59	5	27
pectorosa (Conrad)	R							
Truncilla truncata (Raf.)	R							
donaciformis (Lea)	R							
Plagiola lineolata (Raf.)						59	5	
Leptodea leptodon (Raf.)	R							
fragilis (Raf.)	R							
Proptera alata megaptera (Raf.)				67			5	
Carunculina moesta (Lea)		72	70			59	5	27
Conradilla caelata (Conrad)		72	70	67	62	59	5	27
Medionidus conradicus (Lea)	R							
Micromya trabalis (Conrad)	[2] R							
taeniata punctata (Lea)		72	70	67	62	59	5	27
vanuxemensis (Lea)							5	
Ligumia recta latissima (Raf.)	R							
Lampsilis anodontoides (Lea)	R							
fallaciosa (Smith)	R							
virescens (Lea)				67		59		
ovata (Say)		72	70	67		59	5	
fasciola (Raf.)	R							
orbiculata (Hildreth)	R							
Dysnomia triquetra (Raf.)	R							
arcaeformis (Lea)		72	70	67	62	59	5	27
brevidens (Lea)		72	70	67	62	59	5	27
sulcata (Lea)						59		
haysiana (Lea)		72	70	67	62	59	5	27
personata (Say)			70	67		59	5	
biemarginata (Lea)		72	70	67	62	59	5	27
florentina (Lea)		72	70	67	62	59	5	27
capsaeformis (Lea)		72	70	67	62	59	5	27
torulosa (Raf.)		72	70	67	62	59	5	27
torulosa cincinnatiensis (Lea)		72	70	67			5	27
propinqua (Lea)		72	70	67	62	59	5	27
stewardsoni (Lea)		72	70	67	62	59	5	27
flexuosa lewisi (Walker)		72	70	67	62	59	5	27

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[1] 72=site Lu° 72; 70=site Lu° 70; 67=site Lu° 67; 62=site Lu^{v} 62; 59=site Lu° 59; 5=site Lu° 5; 27=site Ct° 27.

[2] R=Mussels personally collected, or previously recorded from the area, not found in the mounds.

Tables 2, 3, 4, and 5 show in detail the occurrence of the species of mussels in each of the four mounds for which the study of 'this group of mollusks has been completed. In these tables, the relative concentrations of each species, as well as the concentrations of the total mussel fauna, are mirrored in the actual occurrence figures listed for each foot level. The general resemblances of these four mounds may be seen by comparison of these tables; the detailed comparisons and contrasts are discussed under each species of mussel concerned.

TABLE 2.—*Occurrence of fresh-water mussels in site Lu° 70*

Species	Foot level									
	0–1	1–2	2–3	3–4	4–5	5–6	6–7	7–8	8–9	9–10
Fusconaia subrotunda (Lea)	3	3	5	6	1	------	------	------	------	------
appressa (Lea)	1	1	2	3	------	1	------	------	------	------
edgariana (Lea)	6	------	2	5	1	1	------	------	1	1
plena (Lea)	7	1	4	2	1	3	------	------	1	1
cordata (Raf.)	2	------	------	1	------	2	------	------	------	------
tumescens (Lea)	------	------	1	2	3	1	------	------	------	1
Quadrula pustulosa pernodosa (Lea)	1	------	4	4	1	3	------	------	------	------
intermedia (Conrad)	5	2	7	3	6	6	------	------	1	2
biangulata Morrison	------	------	------	1	------	------	------	------	------	------
metanevra (Raf.)	------	1	2	------	------	2	------	------	------	1
cylindrica (Say)	8	1	3	2	1	3	------	------	1	2
Cyclonaias tuberculata granifera (Lea)	46	29	71	45	28	32	------	------	6	11
Lexingtonia dolabelloides (Lea)	5	2	8	7	7	2	------	------	------	5
Pleurobema clava (Lam.)	10	5	10	12	10	6	------	------	2	6
holstonense (Lea)	3	2	2	5	2	2	------	------	------	1
pyramidatum (Lea)	3	6	4	------	------	------	------	------	------	------
Elliptio dilatatus (Raf.)	163	100	205	70	44	36	------	------	8	29
Ptychobranchus fasciolare (Raf.)	1	------	2	2	------	------	------	------	------	------
subtentus (Say)	5	------	7	2	1	1	------	------	------	------
Cyprogenia irrorata (Lea)	20	8	16	67	32	19	------	------	1	7
Dromus dromas (Lea)	71	40	100	100	28	22	------	------	4	17
Obovaria retusa (Lam.)	------	------	------	1	1	3	------	------	------	------
subrotunda globula Morrison	------	------	------	2	------	3	------	------	------	------
Actinonaias carinata orbis Morrison	4	4	6	6	14	4	------	------	3	4
Carunculina moesta (Lea)	1	------	------	------	------	------	------	------	------	------
Conradilla caelata (Conrad)	2	2	1	3	2	------	------	------	------	2
Micromya taeniata punctata (Lea)	6	4	------	2	10	6	------	------	------	2
Lampsilis ovata (Say)	4	3	1	2	------	------	------	------	------	------
Dysnomia arcaeformis (Lea)	16	11	9	36	15	4	------	------	6	7
brevidens (Lea)	1	1	------	1	------	------	------	------	------	------
haysiana (Lea)	2	2	1	6	6	2	------	------	------	2
personata (Say)	------	------	------	------	3	------	------	------	------	------
biemarginata (Lea)	------	------	------	------	------	2	------	------	------	------
florentina (Lea)	5	3	2	11	5	1	------	------	------	4
capsaeformis (Lea)	1	------	2	3	3	------	------	------	------	------
torulosa (Raf.)	171	95	177	89	92	60	------	------	16	14
propinqua (Lea)	73	43	82	155	120	79	------	------	15	51
stewardsoni (Lea)	6	7	8	19	18	2	------	------	1	2
flexuosa lewisi (Walker)	------	1	------	1	3	------	------	------	------	------

TABLE 3.—*Occurrence of fresh-water mussels in site Lu° 67*

Species	Foot level									
	0–1	1–2	2–3	3–4	4–5	5–6	6–7	7–8	8–9	9–10
Fusconaia subrotunda (Lea)	------	------	1	2	------	------	------	2	------	------
appressa (Lea)	3	7	20	11	9	------	------	12	------	1
edgariana (Lea)	------	7	5	7	2	1	------	3	------	------
plena (Lea)	------	4	4	6	------	------	------	12	------	1
cordata (Raf.)	------	------	------	------	------	------	------	1	------	------
Amblema costata (Raf.)	------	------	------	4	------	------	------	------	------	------
Quadrula pustulosa pernodosa (Lea)	------	------	2	------	------	------	------	------	------	------
intermedia (Conrad)	------	2	3	3	3	1	------	7	------	1
tuberosa (Lea)	------	------	------	2	------	------	------	------	------	------
biangulata Morrison	------	1	4	7	3	------	------	8	------	2
metanevra (Raf.)	------	------	------	2	1	------	------	------	------	------
cylindrica (Say)	1	3	------	10	1	------	------	5	------	1
Cyclonaias tuberculata granifera (Lea)	27	59	139	177	56	7	------	368	------	71
Plethobasus cicatricoides (Frierson)	------	------	------	------	------	------	------	2	------	------
Lexingtonia dolabelloides (Lea)	------	------	2	9	5	------	------	6	------	3
Pleurobema clava (Lam.)	4	10	20	22	11	------	------	12	----	6
holstonense (Lea)	------	1	19	11	------	------	------	14	------	------
pyramidatum (Lea)	------	------	------	------	4	------	------	------	------	------
Elliptio dilatatus (Raf.)	17	46	127	148	34	6	------	124	------	21
Anodonta grandis Say	------	1	------	------	------	------	------	------	------	------
Ptychobranchus subtentus (Say)	1	3	11	5	------	------	------	4	------	2
Cyprogenia irrorata (Lea)	2	19	29	47	13	1	------	27	------	1
Dromus dromas (Lea)	11	44	68	79	17	10	------	159	------	41
Obovaria retusa (Lam.)	------	1	------	6	1	------	------	1	------	------
subrotunda globula Morrison	------	------	------	1	------	------	------	------	------	------
Actinonaias carinata orbis Morrison	2	4	8	6	7	------	------	25	------	------
Proptera alata megaptera (Raf.)	------	------	------	------	1	------	------	------	------	------
Conradilla caelata (Conrad)	------	2	8	12	1	------	------	15	------	4
Micromya taeniata punctata (Lea)	1	5	26	7	5	1	------	46	------	9
Lampsilis virescens (Lea)	1	4	37	2	7	------	------	------	------	1
ovata (Say)	------	2	8	6	------	------	------	------	------	------
Dysnomia arcaeformis (Lea)	7	8	42	56	18	4	------	64	------	11
brevidens (Lea)	------	1	1	------	2	------	------	4	------	3
haysiana (Lea)	------	4	4	16	5	------	------	4	------	6
personata (Say)	------	------	2	4	------	------	------	------	------	------
biemarginata (Lea)	------	------	3	------	3	------	------	------	------	------
florentina (Lea)	------	1	12	45	2	------	------	46	------	19
capsaeformis (Lea)	------	------	------	------	------	------	------	15	------	2
torulosa (Raf.)	21	66	151	337	113	19	------	302	------	4
propinqua (Lea)	2	13	61	101	23	5	----	160	------	7
stewardsoni (Lea)	1	5	13	31	9	------	------	17	------	4
flexuosa lewisi (Walker)	------	------	------	3	2	------	------	5	------	------

TABLE 4.—*Occurrence of fresh-water mussels in site Lu° 59*

Species	Foot level																
	0–1	1–1½	1½–2 p	1–2 P	2–3	3–4	4–5	5–6	6–7	7–8	8–9	9–10	10–11	11–12	12–13	13–14	14–15
Fusconaia subrotunda (Lea)	---	16	---	4	---	---	---	3	---	---	---	---	---	1	5	---	---
appressa (Lea)	4	41	89	16	19	17	4	5	14	6	84	21	5	7	39	13	---
edgariana (Lea)	1	12	41	23	1	1	1	2	2	1	4	3	5	5	8	1	---
tumescens (Lea)	---	---	---	---	---	---	---	---	---	---	---	---	---	---	1	---	---
plena (Lea)	---	3	34	29	2	---	---	4	5	2	25	5	1	4	4	---	---
cordata (Raf.)	3	1	4	12	---	---	2	2	7	---	1	---	1	---	11	2	---
Amblema costata (Raf.)	---	5	10	10	1	---	---	2	---	2	5	1	6	2	1	---	---
Quadrula pustulosa pernodosa (Lea)	---	---	---	8	1	---	---	---	3	2	21	1	2	3	4	7	---
intermedia (Conrad)	---	12	7	11	3	6	2	1	4	4	13	2	5	5	15	9	---
tuberosa (Lea)	---	---	1	3	---	---	---	---	---	---	---	---	---	---	---	---	---
biangulata (Morrison)	---	5	16	9	2	2	2	---	9	10	26	2	11	1	22	9	---
metanevra (Raf.)	---	5	3	2	---	1	---	1	2	5	5	1	---	1	4	3	---
cylindrica (Say)	1	14	20	13	2	3	2	5	4	2	21	7	2	1	6	2	---
Cyclonaias tuberculata granifera (Lea)	---	352	665	868	125	75	45	90	173	234	765	213	126	92	380	135	6
Plethobasus cicatricoides (Frierson)	---	---	1	2	---	---	---	---	---	---	2	1	---	1	---	---	---
Lexingtonia dolabelloides (Lea)	---	17	46	40	6	8	1	2	7	16	22	6	4	6	23	7	1
Pleurobema clava (Lam.)	8	73	159	88	14	15	13	4	32	28	114	24	22	19	39	15	---
holstonense (Lea)	---	3	36	15	4	8	3	7	8	6	40	15	7	3	23	4	---
pyramidatum (Lea)	---	5	2	---	6	---	---	---	---	---	---	---	---	---	---	---	---
Elliptio crassidens (Lam.)	2	1	---	---	---	---	---	---	1	3	10	10	---	---	---	---	---
dilatatus (Raf.)	22	295	868	614	77	79	85	113	190	289	1,024	184	132	102	409	74	1
Lasmigona costata (Raf.)	---	---	---	---	---	---	---	---	---	---	1	---	---	---	---	---	---
Anodonta grandis (Say)	---	1	---	---	---	---	---	---	9	2	1	---	---	---	1	1	---
Alasmidonta calceola (Lea)	---	---	---	1	---	---	---	---	---	---	---	---	---	---	---	---	---
marginata Say	---	---	---	---	---	---	---	---	---	---	1	---	---	---	---	---	---
Strophitus rugosus (Swainson)	---	---	---	---	---	---	---	---	1	---	---	---	---	---	---	---	---
Ptychobranchus fasciolare (Raf.)	---	2	6	6	1	---	---	---	---	---	---	---	---	---	2	---	---
subtentus (Say)	---	14	48	44	5	4	8	11	31	13	31	5	12	3	15	---	---
Cyprogenia irrorata (Lea)	---	36	39	20	16	5	5	16	12	25	45	9	10	7	34	20	1
Dromus dromas (Lea)	9	222	233	205	68	37	38	48	61	98	352	159	68	82	220	73	7
Obovaria retusa (Lam.)	---	---	2	1	3	1	---	---	---	---	2	1	---	---	4	1	---
subrotunda globula Morrison	---	2	6	---	---	---	---	---	---	---	---	---	---	---	---	---	---
Actinonaias carinata orbis Morrison	---	6	15	12	---	4	2	4	10	4	23	5	13	7	15	7	---
Plagiola lineolata (Raf.)	---	---	---	---	---	---	---	---	---	---	1	---	---	---	---	---	---
Carunculina moesta (Lea)	---	---	3	1	1	1	---	---	2	4	4	---	1	1	9	---	---
Conradilla caelata (Conrad)	1	2	7	14	2	1	2	1	6	3	18	3	4	3	9	2	1
Micromya taeniata punctata (Lea)	---	36	145	97	8	10	10	10	46	18	80	24	22	12	39	6	---
Lampsilis virescens (Lea)	---	---	5	---	---	---	---	---	1	---	---	---	---	---	1	---	---
ovata (Say)	---	1	5	5	---	---	8	26	37	20	62	5	8	11	19	1	---
Dysnomia arcaeformis (Lea)	1	46	75	53	6	17	22	14	22	45	85	20	30	28	58	35	1
brevidens (Lea)	2	7	12	16	---	1	3	3	3	13	2	1	6	3	10	1	---
sulcata (Lea)	---	---	---	---	---	---	---	1	---	---	---	---	---	---	---	---	---
haysiana (Lea)	---	9	31	10	2	6	3	7	16	6	31	14	7	5	17	11	---
personata (Say)	---	---	5	---	---	---	---	2	---	---	3	1	1	---	1	---	---
biemarginata (Lae)	---	---	---	---	---	---	---	---	2	---	---	---	---	---	2	2	---
florentina (Lea)	---	11	23	37	2	2	1	4	11	10	14	9	2	6	16	2	---
capsaeformis (Lea)	---	6	92	51	1	---	8	10	71	31	118	16	28	20	104	8	1
torulosa (Raf.)	1	234	395	310	49	66	83	64	130	197	501	114	93	90	231	79	2
propinqua (Lea)	1	40	36	28	3	12	5	17	40	32	79	26	17	59	100	45	1
stewardsoni (Lea)	---	12	27	10	7	4	2	5	9	2	27	8	4	12	25	10	---
flexuosa lewisi (Walker)	---	1	3	---	---	2	---	1	3	---	1	1	1	---	6	---	---

TABLE 5.—*Occurrence of fresh-water mussels in site Lu° 5*

Species	Foot level								
	0–1	1–2	2–3	3–4	4–5	5–6	6–7	7–8	8–9
Fusconaia subrotunda (Lea)	------	2	2	11	3	6	------	------	------
subrotunda pilaris (Lea)	------	------	------	------	------	------	------	1	1
appressa (Lea)	------	------	------	1	7	4	------	2	4
edgariana (Lea)	------	10	12	37	12	11	------	10	------
tumescens (Lea)	------	------	------	------	------	------	------	------	1
plena (Lea)	2	9	2	15	8	6	------	------	10
cordata (Raf.)	------	------	------	------	------	3	------	2	6
Amblema costata (Raf.)	3	5	15	19	2	1	------	------	3
Quadrula pustulosa pernodosa (Lea)	------	12	4	15	9	7	------	2	5
intermedia (Conrad)	------	4	1	6	10	3	------	1	1
tuberosa (Lea)	1	------	------	6	2	------	------	------	------
biangulata Morrison	------	1	2	1	1	3	------	------	------
metanevra (Raf.)	------	1	------	6	3	1	------	------	3
cylindrica (Say)	------	2	4	7	1	------	------	------	------
Cyclonaias tuberculata granifera (Lea)	5	60	56	239	210	143	------	9	26
Plethobasus cicatricoides (Frierson)	------	1	------	------	2	------	------	------	------
Lexingtonia dolabelloides (Lea)	1	8	14	43	12	10	------	4	8
Pleurobema clava (Lam.)	9	23	34	109	50	34	------	10	17
holstonense (Lea)	------	------	------	6	2	------	------	------	5
pyramidatum (Lea)	------	1	2	8	3	------	------	1	1
Elliptio crassidens (Lam.)	1	1	2	53	------	------	------	------	1
dilatatus (Raf.)	18	65	78	232	149	100	------	42	15
Ptychobranchus fasciolare (Raf.)	------	1	3	4	4	4	------	2	------
subtentus (Say)	------	------	1	1	------	------	------	------	------
Cyprogenia irrorata (Lea)	------	4	3	17	9	7	------	6	3
Dromus dromas (Lea)	4	20	6	70	100	78	------	5	1
Obovaria retusa (Lam.)	------	2	------	------	2	------	------	------	1
subrotunda globula Morrison	------	3	5	18	5	3	------	1	17
Actinonaias carinata orbis Morrison	1	1	6	22	15	10	------	5	4
Plagiola lineolata (Raf.)	------	1	1	1	1	------	------	------	------
Proptera alata megaptera (Raf.)	------	------	------	1	------	------	------	------	------
Carunculina moesta (Lea)	------	2	5	8	1	4	------	1	3
Conradilla caelata (Conrad)	------	3	5	7	2	2	------	2	1
Micromya taeniata punctata (Lea)	1	1	12	26	5	6	------	11	3
vanuxemensis (Lea)	------	------	------	1	------	------	------	------	------
Lampsilis ovata (Say)	------	------	1	3	------	------	------	------	------
Dysnomia arcaeformis (Lea)	1	25	9	31	24	25	------	9	29
brevidens (Lea)	1	5	3	2	2	------	------	------	------
haysiana (Lea)	------	5	------	4	1	------	------	1	3
personata (Say)	------	------	1	------	1	------	------	------	------
biemarginata (Lea)	------	2	2	------	1	------	------	1	------
florentina (Lea)	------	------	4	6	1	5	------	1	5
capsaeformis (Lea)	------	------	------	3	------	------	------	------	------
torulosa (Raf,)	12	40	40	127	123	75	------	34	58
propinqua (Lea)	4	68	27	118	189	142	------	118	23
stewardsoni (Lea)	------	1	1	9	7	9	------	7	4
flexuosa lewisi (Walker)	------	4	------	3	1	2	------	1	------

The total number of 56 mussel species found in the mounds studied compares very favorably with Ortmann's listing (1925) of 95 forms from the Lower Tennessee System. Further comparison will demonstrate how much more complete the faunal list from the mounds is than these figures indicate. If we subtract from the 100 species known from the Lower Tennessee System (5 forms are known from other sources than Ortmann's list), the 40 forms that are either confined to the smaller (tributary) streams or are known to be practically limited to deep water, we find that 60 forms are to be expected here in the shoal waters. Of course, a few of the 56 forms recorded here are from deeper water, but with a faunal list of about 50 of the 60 forms expected, we have a solid base for the assumption that the shell mounds in this area are composed of shells taken only from the shoal waters of the Tennessee River. It is the writer's belief also, that none of these shells were carried any appreciable distance up or down river.

C. C. Adams, in his monograph of the genus *Io*, discusses this problem of transportation of shells by the Indians that used them for food. After a complete discussion of both sides of the question, he ends up by stating (1915, p. 43) that: "I have not been able to recognize the influence of this factor" (transportation). Earlier (on p. 22) he states: "This is an example of the general rule, that the shells found at the old Indian camps are a fair index of the local *Io* fauna."

If these mound builders gathered any mussels from the tributary streams, they must not have carried them back to the mound sites on which they lived, as such tributary forms are not to be found in the shell deposits. Also, if the Indians got into deeper waters (more than 1 meter in depth) in gathering mussels for food, it must have been on rare occasions. The small numbers of certain deep-water-inhabiting mussels present in the deposits may be easily accounted for on the assumption that they were individual stragglers in shoal water, or that the margin of their habitat zone was occasionally exposed at times of extreme low water in the Tennessee River.

In the discussion of the mussel shells by species, it is thought best to include all those known from this part of the Tennessee River, so that the reader will get a complete story of the fauna. The probable reasons for the absence of the missing forms are given, when such reasons are known.

NOTES ON SPECIES OF FRESH-WATER MUSSELS

Margaritana monodonta (Say).

According to Ortmann (1925) this species is locally abundant; it was found by him at Mussel Shoals, below Wilson Dam. Dead shells were found by the writer in the drift near the middle of Seven Mile Island, below Florence. R. E. Call (1899, p. 526) gives the following account of its ecology: "The habits of the animal render it difficult to find . . . It buries itself far down in the gravel and mud, on the falls [of the Ohio], under large flat rocks where the water circulates freely, or alongside submerged timbers which are well buried in the mud of the river bottom." Hinkley, in speaking of its occurrence at Florence (1906, p. 54) says: "The living ones were plentiful under rocks in the shallow water, as many as two hundred being found under one slab." It is not surprising, therefore, that this species is missing from the shell mounds. If the Indians took every form they could see, this one was present but not seen.

Fusconaia ebena (Lea).

Recorded from Mussel Shoals (Ortmann, 1925), and undoubtedly present in abundance in this part of the Tennessee, but not obtained for food because of its deeper water habitat (1 to 3 meters).

Fusconaia subrotunda (Lea).

Occurs only sparingly in the mounds, because of its moderately deep-water habitat. The presence of any appreciable number of specimens in any one sample is probably indicative of a period of unseasonably low water.

Fusconaia cuneola appressa (Lea).

Known from the Mussel Shoals region since the time of Isaac Lea, it has never been found in abundance. It occurred sparingly in the samples taken from the mounds, indicating little if any change in numbers from that day to this.

Fusconaia undata trigona (Lea).

Not reported from the Tennessee by Ortmann (1925), but found by the writer in December 1937 in drift at "Little Slough" on the north side of Seven Mile Island, below Florence, and also in button-shell discard piles along the river bank in Tennessee near the Tennessee-Alabama State line, and at Boyd's Landing, in Hardin County. It prefers deeper water than was found on the shoals, and hence, if it was present in this portion of the Tennessee when the mounds were accumulated, it was not seen and gathered for food.

Fusconaia edgariana (Lea).

A characteristic form of the shoals. Its presence as far downstream as site Lu° 72, 4 miles west of Waterloo, is indicative of a change in the aspect of the river at this place.

Fusconaia barnesiana tumescens (Lea).

Mussel Shoals, east of Florence, is the furthest downstream record of the recent occurrence of this form; its presence in these shell mounds 3 and 4 miles west of Waterloo (about 32 miles below Florence) indicates its upstream retreat as the river conditions changed in the interval between the building of the mounds and the present time.

Fusconaia plena (Lea).

Recorded as far upstream as Bridgeport, Ala., by Ortmann (1925) and found at "Little Slough" opposite Seven Mile Island, in button-shell discard piles at Newport Landing (site Ct° 27), and at the Tennessee-Alabama State line by the writer. This species has enough of an ecological "spread" over different types of bottoms and depths to show no difference in distribution in the comparison of the mound samples with the living fauna of the same place.

Fusconaia cordata (Raf.).

Ortmann (1925) says this species is "rather abundant in the main river." Its preference for deeper water is indicated by the specimens personally taken from a button-shell discard pile at Boyd's Landing, Hardin Co., Tenn., which had been collected with mussel-bars. Only a few, mostly young, shells were found in the mounds studied.

Megalonaias gigantea (Barnes).

Recorded from Mussel Shoals by Hinkley (1906, p. 54) and Ortmann (1925), and found near Newport Landing and near the Tennessee-Alabama State line by the writer. It is usually buried to the siphons in the bottom in deeper water; hence was not gathered for food by these mound builders.

Amblema costata (Raf.).

Present, but not abundant in the mounds studied. Ortmann (1925) says "abundant," but this undoubtedly includes many deeper-water records as well as shoals habitats.

Tritigonia verrucosa (Raf.).
Quadrula fragosa (Conrad).

Both these species are missing from the mounds studied, because of their preference for deeper water and usually a rather muddy bottom.

Quadrula pustulosa pernodosa (Lea).

The form of this species in the Mussel Shoals region is clearly distinct from the typical subspecies, contrary to Ortmann's remarks (1918). It is characteristic of the Tennessee region, but apparently not abundant here. More study of this species as found in the lower Tennessee is desirable, in order to determine in what stretch of the river the change to typical *pustulosa* occurs.

Quadrula intermedia (Conrad).

Present, of the typical compressed form, but not common in the shell mounds. Not reported in the recent fauna below Mussel Shoals, hence this species may be taken as an indicator of the change in river conditions since the mounds were laid down.

Quadrula tuberosa (Lea).

This species is present in small numbers from most of the mounds studied. It is distinct by reason of the height and prominence of the tubercules, and by the rounded and unprojecting posterior ridge, in front of which the radial furrow is variable, completely obliterated in the type, and nearly so in the other specimens seen both from recent and mound materials.

Quadrula sparsa (Lea).

Not known from the Mussel Shoals region, but included here in order to clear up the specific arrangement of the group to which it belongs. The type lot, U. S. N. M. No. 84222, contained a mixture of species and specimens from three localities, due to mixing subsequent to the original sendings to Lea and previous to cataloging in the United States National Museum collections. Such mixtures undoubtedly helped bring about the mistaken conclusion of Ortmann (1918, p. 541) that *intermedia*, *sparsa*, and *tuberosa* are conspecific. The true *sparsa* of Lea is a small thin form of small rivers of the Upper Tennessee region, with the tubercules small or obsolete, with a low but distinct posterior ridge that does not project beyond the general outline of the shell in umbonal view, and a small, but unobliterated radial furrow in front of the ridge.

Quadrula biangulata, new species.

Shell ovate, with a rounded notch at the middle of the posterior margin, formed by the posterior radial furrow, which is typically devoid of tubercles. The anterior radial furrow is clearly present, although a little obscured by the tubercles covering more than three-fourths of the length of the shell. In most specimens the upper and lower posterior points of the shell, the wing and the posterior ridge, respectively, project equally, their tips falling in a line perpendicular to the base line of the shell. The hinge is straighter than in the three other regional members of the group, and larger in proportion because of the length of the wing producing the regular notched ovate profile outline. Pseudocardinals strong and pits deep; three in right valve, the middle one prominent, the anterior and posterior ones slight to obsolete; two, strong, in the left valve. Laterals heavy, two in the left, one in the right; but tending more than any other member of the group to have the laterals doubled, to three in the left and two in the right valve.

The type, U. S. N. M. No. 84221, was sent to Lea by Pybas, from Tuscumbia, Ala., and measures: Length, 33 mm.; height, 30.5 mm. diameter, 21 mm.

There are four additional recent specimens before me, two smaller specimens (paratypes) in the type lot U. S. N. M. No. 84221, and two specimens, U. S. N. M. No. 84220, received from Florence, Ala. by Lea from G. White. The finding of this distinct little form in the Indian mound shell deposits led to its tracing out in the recent or living fauna.

In general form it resembles *intermedia*, but is much more inflated and possesses a widely flattened posterior ridge with subequal furrows anterior and posterior to it. It differs from *metanevra* by its rounded general outline in umbonal view, and the low, flattened or biangulate posterior ridge; from *sparsa* by the more flattened form of the ridge and the more prominent tubercles; from *tuberosa* by its usually lesser proportionate height and the well-defined radial furrow in front of the posterior ridge.

Quadrula metanevra (Raf.).

Represented in the mounds by only a few, mostly young, individuals. They may be recognized on account of the protrusion of the tuberculate posterior ridge as the widest part of the shell in umbonal view.

Quadrula cylindrica (Say).

Found in all the mounds studied except at site Ct° 27, but always in small numbers. It is apparently not abundant in this part of the Tennessee River.

Cyclonaias tuberculata granifera (Lea).

This form of the "purple pimple-back," characteristic of large rivers, was extremely abundant in all the mounds. It constituted one of the major fractions of the mussel fauna that was used for food in building up the shell deposits. Considerable variation is seen among these shells, with an almost unbroken series possible of selection that would range from close to the typical form of *tuberculata* to a phase almost identical with the variety *pusilla* of Simpson. Since the vast majority of individuals are clearly referable to *granifera*, it was thought best to consider the population of this species as a whole. Any attempt to split them into groups would have to be arbitrary, and in connection with this study rather meaningless, since we have no proof as to which spot in the river produced which variations.

Plethobasus cooperianus (Lea).

Recorded from the Tennessee in this region by Ortmann (1925), but not found in any of the mounds studied. It is possible, but highly improbable, that any specimens escaped notice in the thousands of mussel shells referred to *granifera*, as this species may be distinguished by other characters as well as by the difference in color of nacre. It could not be confused with *pernodosa* as found in this region, not being as high as that species.

Plethobasus cyphyus compertus (Frierson).

Only a few individuals of this Tennessean subspecies were found, but they were unmistakable, being in fine condition. Such excellent preservation probably reflects the extreme hardness of these shells.

Plethobasus cicatricoides (Frierson).

Unio varicosus Lea, Trans. Amer. Phil. Soc., vol. 4, p. 90, pl. 40, fig. 20, 1829 (nec: *Unio varicosa* Lam. 1819).
Pleurobema cicatricosa Simpson, Synopsis, p. 765, 1900.
Pleurobema cicatricosum Simpson, Descr. Cat., p. 807, 1914 (nec: *Unio cicatricosus* Say, 1829).
Unio detectus Frierson, Nautilus, vol. 25, p. 52, 1911.
Unio cicatricoides Frierson, Nautilus, vol. 25, p. 53, 1911.

Only a few specimens seen in this material. Frierson has pointed out the mistakes that long existed in the nomenclature of this species. He gave two new names (for variations of this shell), to replace Lea's preoccupied *varicosus;* the second name (in pagination) is selected here as best conserving the usage of author's *cicatricosus* for this long recognized form, and creating the least confusion in necessarily changing a name of long standing.

Lexingtonia dolabelloides (Lea).

Present in moderate abundance in the mounds. It is seen as a species very variable in size, degree of inflation, and relative height of shell, in this region. However, no specimens from the mounds were referable to the tributary stream subspecies, *conradi* of Vanatta.

Pleurobema clava (Lam.).

Taken, in some numbers, from certain samples of the shell-mound material studied. It is not known in the recent fauna below Mussel Shoals. Its presence, in typical form, as far downstream as site Lu° 72, 4 miles west of Waterloo (more than 30 miles below Mussel Shoals), in the shell mounds, adds another indication of the upstream retreat of the mussel fauna in the time elapsed since these specimens were gathered for food.

Pleurobema holstonense (Lea).

Generally present, but uncommon in the samples taken from the Indian shell mounds. The specimens seen were more or less uniformly small and well-inflated, in direct contrast to the posteriorly pinched appearance of *P. clava.*

Pleurobema pyramidatum (Lea).

This species does not show its extreme obliquity in the specimens from this region. Reading between the lines of Ortmann's notes (1925 p. 340) one finds *pyramidatum* recorded as preferring medium-sized rivers in the Tennessee drainage. Its presence here may thus in a small way indicate more shoal conditions in this stretch of the Tennessee than at present obtain.

Elliptio crassidens (Lam.).

Ordinarily living in water too deep for wading, this species is represented in the mounds by few individuals. In those samples including numbers of this form, its presence may be interpreted as reflecting periods of unusually low water in the river.

Elliptio dilatatus (Raf.).

An abundant, extremely widespread, and ecologically somewhat ubiquitous or tolerant species. As one of the most abundant forms in these deposits, it formed one of the staple items in the fresh-water mussel diet.

Lastena lata (Raf.).

Recorded as rare in the recent fauna at Mussel Shoals. It probably was not seen and gathered for food on account of its burrowing habits.

Lasmigona costata (Raf.).
Anodonta grandis Say.
Alasmidonta calceola (Lea).
Alasmidonta marginata (Say).
Strophitus rugosus (Swainson).

These species, the only representatives of the subfamily Anodontinae found in the deposits, are present in small numbers only, if represented by more than one specimen each. They reflect the sporadic or scattered occurrence of the subfamily in the living mussel fauna of the Tennessee region. The majority of these forms are creek or small-river forms, hence they are not abundant in the river proper.

Ptychobranchus fasciolare (Raf.).

Present, but uncommon in the shell mounds. One left valve found in the 1- to 2-foot level of site Lu° 5 is interesting as clearly referable to the form *camelus* of Lea. This broken valve measures 60 by 57 by 19 mm.; in a restored condition it would measure approximately 80 mm. in length; 60 mm. in height; and 38 mm. in diameter.

Ptychobranchus subtentus (Say).

Ortmann (1925) says this species is locally abundant, chiefly towards the headwaters. In this case we have another example of a mussel that finds the "shoals" habitat similar enough to the conditions of a smaller stream, to be suitable. It is a characteristic species, but not abundant here.

Obliquaria reflexa (Raf.).

The absence of this species, known from Mussel Shoals, is best explained by reason of its deeper-water habitat on a rather muddy bottom. It is not a form of tributary streams.

Cyprogenia irrorata (Lea).

A characteristic form of the Cumberlandian region, found in moderate abundance, in nearly all the samples studied. Some of the material seen is extremely variable in outline of the shell, much more so than might be explained on the basis of sexual differences. These specimens are uniformly rather small for the species as found elsewhere.

Dromus dromas (Lea).

One of the most abundant species in these shell deposits. According to the number of specimens handled in the course of this study, *dromas* must have been very abundant here previously. These specimens are of good size for the species, and made up a major part of the total mussel fauna gathered for food.

Obovaria retusa (Lam.).

Nearly confined to the deeper waters of the Tennessee River, as shown by the shells discarded along this section of the river by button-shell clammers, and by its general but scattered occurrence throughout these shell mounds. These stragglers either represent individuals that wandered onto the shoals, or periods of somewhat unusually low water in the river at the time of collection.

Obovaria subrotunda parva Simpson.

Obovaria subrotunda parva Simpson, Descr. Cat., p. 294, 1914.

The description of this variety from: "(1a) Maumee and (1b) Wabash Rivers; (2) Sandusky, Ohio; (3) Tennessee" is confusing when reviewed geographically. The Maumee River and Sandusky, Ohio, specimens belong with *liebii* (Lea) in the Great Lakes Drainage. The Wabash River specimens are either another depauperate form from the upper reaches of that river, or the subspecies *liebii*, introduced into that stream from the Maumee by means of the old Wabash-Erie Canal. The "Tennessee" citation is highly indefinite, but possibly refers to the large-river subspecies of the lower Tennessee. Under the circumstances, it is thought best to eliminate the name *parva* as an unfortunate mixture by restricting it to the northern depauperate form and considering it synonymous with *liebii* of Lea.

Obovaria subrotunda globula, new subspecies.

This subspecies differs from the type in being smaller and more inflated. Some specimens seen are so inflated and high in proportion as to be easily confounded with young specimens of *retusa*, but these may be easily separated from that species by the much straighter and slighter hinge and less prominent umbones.

The type, U. S. N. M. No. 85789, is from Tuscumbia, Ala., received from Thornton by Lea, and measures: Length, 27.0 mm.; height, 26.5 mm.; diameter, 18.2 mm. Another specimen, U. S. N. M. No. 85740, was received by Lea from G. White as from the Tennessee River. This specimen very likely came from the Mussel Shoals region also. It measures: Length, 31.5 mm.; height, 29.2 mm.; diameter, 21.7 mm. The specimen from the lower part of the Sequatchee River at Jasper, Tenn., U. S. N. M. No. 133435, mentioned by Simpson (1914, p. 296) as being *parva*, belongs here also.

A number of specimens were recovered from these shell mounds along the Tennessee River below Florence and Tuscumbia, Ala., in the course of this study. There is little variation in size among these specimens; some are less inflated, approaching in this respect the typical form of *subrotunda*.

Obovaria olivaria (Raf.).

Recorded as preferring rather deep water (1–2.5 meters), hence it is not surprising that here on the southern edge of its range it was not to be found on the shoals in enough abundance to show up in the sampling of the mounds, if indeed it is at all present in them.

Actinonaias carinata orbis, new subspecies.

Simpson's treatment of *carinata* was left incomplete because he failed to see the distinctness of the Cumberlandian and Ozarkian forms of this widespread species. The type of *A. c. gibba* Simpson (1914, p. 82), U. S. N. M. No. 160597, was selected by W. B. Marshall, June 28, 1929, and comes from the Black River, Black Rock, Ark. This specimen, collected by W. D. Burd, is an extremely old, heavy, male shell. It measures 95 by 70 by 63 mm. A female shell, U. S. N. M. No. 366445, not so abnormal in appearance, measures 92 by 63 by 52 mm.

In the light of the clearly separable geographic form from the Cumberland and Tennessee Rivers, it seems best to name the subspecies *orbis*, because it is not "fat" like the Ozarkian form, but tends to be more nearly orbicular. It is usually laterally compressed, somewhat similar to the form presented by male individuals of *Plagiola lineolata* (Raf.). *Orbis* is flattened in front of the posterior ridge, in contrast to both males and females of *gibba*, which are swollen in that region.

The type of the subspecies *orbis*, U. S. N. M. No. 84998, is from Florence, Ala., received by Lea from G. White, and measures: Length 66 mm.; height 49.5 mm.; diameter 32.5 mm. An extreme individual of the compressed form abundant in the Upper Tennessee region (U. S. N. M. No. 25413, from the Holston River, collected by Andrews) measures 67 by 53.5 by 28 mm. As Ortmann's records show (1925, p. 349), the typical form of *carinata* is not known to occur upstream of the mouth of the Duck River in Tennessee. As shown by all the recent and Indian Mound specimens seen, *orbis* is the only form of the species in the Tennessee River in the Mussel Shoals region.

Actinonaias pectorosa (Conrad).

While this species has been found at Mussel Shoals by Hinkley, it is primarily a species of smaller streams, and was not to be seen in these deposits of shells originating from the Tennessee River.

Truncilla truncata (Raf.).

Truncilla donaciformis (Lea).

The reason for the lack of specimens of these two species from the mound deposits is not clear. Ortmann (1925) records them as locally abundant. From his remarks on their present distribution in the Tennessee River System it is entirely possible that they have only recently migrated into this area. In some of the more northern rivers, they are abundant in just such areas as these shoals of the Pickwick Basin area.

Plagiola lineolata (Raf.).

This showy, deeper-water species was found only as single scattered individuals in two of the mounds, clearly indicating its ecological preferences.

Leptodea leptodon (Raf.).

Leptodea fragilis (Raf.).

Leptodon is recorded as rare here, as it is known generally, while *fragilis* is abundant in this stretch of the Tennessee River. The habit of the genus, to live in muddy bottoms in deeper water, prevented their collection by the Indians for food.

Proptera alata megaptera (Raf.).

Primarily an inhabitant of muddy bottoms in deeper water, along with mussels of the genus *Leptodea*, this species furnished only a few individuals for the building of the mounds. A few fragments of this large, flattened shell furnish the only record of its occurrence in the shell deposits.

Carunculina moesta (Lea).

This interesting little genus of "Pygmy Mussels" is represented in the mounds by only one species, *moesta*. Call's record of *parva* from Tuscumbia (1885, p. 41), was based on one of the species otherwise known to be present, and is a result of his idea that all members of this genus are syntonic forms of one species, namely, *parva*. *C. moesta* groups with *texasensis*, while *cylindrellus* which is also present in the region, but restricted to the tributary streams, is the Tennessee representative of the group of *C. glans*.

Conradilla caelata (Conrad).

This extremely characteristic little shell was found throughout the mounds, but as is the case in the recent fauna, nowhere in great abundance.

Medionidus conradicus (Lea).

As Ortmann states (1925, p. 354), his record of this species from the Tennessee River is based on a single specimen. It is primarily a tributary stream species, and was not seen in any of the shell deposits studied.

Micromya trabalis (Conrad).

If this species is represented in the area by more than a few specimens on which Hinkley (1906) and Ortmann (1925) base their Mussel Shoals records, it is probably locally more abundant in the smaller (tributary) streams. None were found among the thousands of shells examined for this study.

Micromya taeniata punctata (Lea).

This is the Mussel Shoals subspecies of *taeniata*. Ortmann's failure to recognize the form was probably due to lack of specimens. It was found in moderate to slight abundance at all the mound sites studied.

Micromya vanuxemensis (Lea).

Only one specimen, from the mound at site Lu° 5, was seen of this form, typically from small streams.

Ligumia recta latissima (Raf.).

Lampsilis anodontoides (Lea).

Lampsilis fallaciosa (Smith).

These three species have been reported from Mussel Shoals, but were not seen in the Shell Mounds. It is likely that they were too local in their habitat in the river, or in the case of the last two, possibly in too great a depth of water, to have been gathered for food.

Lampsilis virescens (Lea).

Seen only in small numbers in the course of this study, thus indicating its preference for the tributaries, in this area.

Lampsilis ovata (Say).

This large mussel was seen only sparingly in the mounds, although generally distributed in them. The most logical explanation for their scarcity here is the probability that their habit of burrowing deeply into the bottom prevented or hindered their discovery by the Indians. Less probable is the possibility that the toughness of the older, larger individuals relegated them to use as fish bait. In that case, their shells should still be present in greater numbers than was observed.

Lampsilis fasciola (Raf.).

Lampsilis orbiculata (Hildreth).

Dysnomia triquetra (Raf.).

These three species are known from this section of the Tennessee, but were not to be found in the shell mounds. Their deeper-water habitat in the larger rivers may account for their absence here.

Dysnomia arcaeformis (Lea).

The type locality of this species must stand as originally cited: "Tennessee River." Careful reading of Lea's later remarks as to Troost's failure to find it in the Tennessee (1834, p. 86), shows that they are not a correction of the type locality. There are a number of specimens in the United States National Museum collections, including some received later from White by Lea as from Florence, Ala., which prove its presence as a member of the lower Tennessee fauna. Hinkley's failure to find it at Florence is puzzling, unless possibly it was confused with *triquetra* (1906, p. 52). Its abundance, and general distribution in the shell mounds studied, argues against any assumption that it is extremely localized in its occurrence here in the Tennessee River.

Dysnomia brevidens (Lea).

The scattering of individuals seen helps to convey the idea that this is near the downstream limit of its occurrence in the Tennessee River. Only a few individuals were found, generally distributed through the shell mounds studied.

Dysnomia sulcata (Lea).

A deeper-water species, represented in these shell deposits by only one specimen, from the 5- to 6-foot level of the mound at site Lu^{o} 59. Hinkley (1906) and Ortmann (1925) record it from Mussel Shoals; and the writer found it on the river bank near mounds at site Ct^{o} 27 and site Lu^{v} 62, and at a point in Hardin County, Tenn., just beyond the Tennessee-Alabama State line, in the discard piles of button-shell mussel fishermen.

In this connection, a correction is in order on the naming of a variety of *sulcata* from the Great Lakes Drainage. *Dysnomia "sulcata" delicata* Simpson (1914, p. 16), by a reexamination of the type, U. S. N. M. No. 160853, proves to belong not to this species, but to approach *rangiana* (Lea). This type specimen from Amherstburg, Mich., received from Walker, is a male, with the anterior end peculiarly foreshortened. The slight furrow present is pointed at a different sector of the margin than is the indistinct furrow of male shells of *sulcata*. Another specimen, U. S. N. M. No. 25725, a female of the same anteriorly foreshortened form, from Michigan, received from Lieb, shows the abrupt internal excavation and postbasally compressed expansion of the marsupial portion of the shell. Thus *delicata* is the Great Lakes drainage form or subspecies of the *torulosa* group.

Dysnomia haysiana (Lea).

Present generally throughout the deposits, but uncommon. Not rare as Ortmann (1925) says, but just not found in numbers.

Dysnomia personata (Say).

Only a very few stragglers seen in the mounds studied, reflecting its deeper-water habitat.

Dysnomia biemarginata (Lea).

Ortmann says it seems to be abundant at Mussel Shoals, but it proved to be almost lacking in these mounds from further downstream.

Dysnomia florentina (Lea).
Dysnomia capsaeformis (Lea).

These two relatively thinner-shelled species were largely represented by fragments, so that the number of specimens counted per sample may be a little higher in proportion to the population than in some of the other mussel species. Nevertheless, the fluctuations in numbers of these, especially of the latter, are in need of further study.

Dysnomia torulosa (Raf.).

One of the most characteristic, and most important from the standpoint of food supply, of the mussels found in these shell mounds. Very variable as is its want, and represented by many fine large specimens in this material. This section of the Tennessee River evidently affords optimum habitat conditions for *torulosa*, as shown by the mound material and by the recent specimens in the Lea collection from Florence, Ala.

Dysnomia torulosa cincinnatiensis (Lea).

This variety (or species?) is represented only sparingly in five of the seven mounds studied. If more recent material is found, in perfect shape, it will probably become necessary to separate this from *torulosa* as a distinct species. Comparison with Lea's type specimens shows perfect agreement in the narrow row of small, pinched-up tubercles in the median row, with often a secondary row in evidence in the adjoining portion of the radial furrow, and of the markedly more swollen marsupial portion of the female shells. More recent material that is unbroken in the postbasal region (particularly females) is necessary before this question can be completely settled.

Dysnomia propinqua (Lea).

Ortmann's treatment of this form as a variety is unfortunate. In the hundreds, even thousands of each seen and identified in the course of this study, there were no intergrades between *torulosa* and *propinqua*. This writer does not believe two forms of animal life can live side by side in one type of habitat in one body of water, without intergrading, and be considered as anything except two distinct and natural species. In the light of the extremely specialized mode of reproduction of the fresh-water mussels, this principle must be considered as more important here than in many other groups of animals. *Propinqua* more or less equals *torulosa* in abundance in the earlier (lower) levels of the mounds studied. Towards the later (upper) levels of the deposits, a gradual change is seen to occur; *torulosa* continues in great or greater abundance, while the numbers of *propinqua* fall off considerably. This reduction in numbers of one form only, without proportionate change of the second, is another proof of the two specific entities involved. Viewed in connection with the known occurrence of these two species in the recent fauna, this gradual decline in numbers is another positive indication that the mussel fauna has been slowly retreating upstream, since the shell mounds were started, keeping pace in this manner with the forces of river erosion that change the region in which their optimum living conditions are maintained in the Tennessee River.

Dysnomia stewardsoni (Lea).

Sparingly but generally found in the mound samples. It is one of the characteristic species that geographically "localize" the appearance of this fauna of fresh-water mussels. Contrary to Ortmann's remarks (1925, p. 364), this species is known from the Holston, Clinch, and

Tennessee Rivers of the upper Tennessee region; the Tennessee in northern Alabama; and the Cumberland River, Tenn. The United States National Museum collections include the following lots of *stewardsoni:*

U. S. N. M. No.:
84605. One young male and one young female, from Chattanooga, Tenn. (Stewardson). These are the types, and the type locality should be read as "Chattanooga, River Tennessee."
84604. Males and females from Tuscumbia, Ala. (Thornton).
84606. One old male from Florence, Ala. (White).
25723. One female from Holston River, Tenn.
26179. One male and one female from Holston River, Tenn. (Miss A. E. Law).
25724. Males and females from Cumberland River, Tenn.

Dysnomia flexuosa lewisi (Walker).

This extremely characteristic form is found sparingly in the mound deposits, reflecting both its probable scarcity in the fauna and its suggested habitat on muddy bottoms, in deeper water (Call, 1899, p. 511). In spite of Ortmann's opinion (1918, p. 588) in regard to the figures published by Walker, they truly represent this form. The National Museum collections include just such an old male as Walker has figured, U. S. N. M. No. 84604 *a*, from Tuscumbia, Ala. (Thornton). Originally labeled as *stewardsoni* in the Lea collection, it possesses the flat-bottomed radial furrow that is characteristic of *flexuosa* and the subspecies *lewisi.*

FRESH-WATER SNAILS

Examination of the list of fresh-water mollusks, other than mussels, shows that there is a total of 33 forms from this area. There are 3 groups of these other fresh-water forms, as divided on the basis of their occurrence in the shell deposits of these mounds in the Pickwick Landing Basin. The first group includes only 7 species, but is the most important group from our viewpoint. These 7 larger snails are rather constantly present, in numbers, from nearly all the samples, and form a sizable fraction of the total molluscan food eaten by these mound inhabitants. The second group is also of importance as a source of food, and includes 15 additional species that were used as food, but that were present in small numbers, or only at certain times, or places. Thus they form a group of secondary importance in regard to their food value. The third group is made up of those more minute forms, 11 in number, that are only accidentally present. They are species whose individuals are too small in size to form any amount of food value, even in the aggregate. They must have been introduced in the mud adhering to the mussel shells carried in, or in some cases they were actively adhering to the shells of larger species or to the stones from the river brought in for cooking uses.

The amount of the fresh-water snails used as food is seen as varying a good deal in various samples. In some samples, a decrease in the amount of mussel food used is accompanied by an increase in the amount of snail food. To the writer, this would indicate that these two sources of food supply were used to supplement each other, at least in times of scarcity.

Table 6 shows the distribution of the fresh-water snails in the mounds studied. Their occurrence in the mound at site Lu° 67, and in the mound at site Lu° 59, is shown in tables 7 and 8, respectively. These two mounds are the only ones of the seven sampled, for which the study of the fresh-water snails has been quantitatively completed. As in the case of the tables on occurrence of the mussel species, the figures given are those of actual occurrence in the 1.3 cubic feet of each sample.

TABLE 6.—*Fresh-water snail distribution in shell mounds*

Species	Site[1]						
Pisidium virginicum (Gmelin)[2]					59	5	27
Viviparus contectoides (W. G. B.)			67	62	59	5	27
Lioplax subcarinata (Say)					59		
Campeloma ponderosum (Say)	72	70	67	62	59	5	27
lewisi (Walker)			67		59		
Amnicola olivacea Pilsbry			67		59		27
Pyrgulopsis scalariformis (Wolf)	72						27
Somatogyrus aureus Tryon			67		59		
humerosus Walker	72	70	67	62	59		27
excavatus Walker		70	67	62	59		
strengi Pilsbry & Walker			67	62	59		
Angitrema armigera (Say)							27
Lithasia salebrosa (Conrad)	72	70	67	62	59	5	27
verrucosa (Raf.)	72	70	67	62	59	5	27
Strephobasis curtum (Hald.)	72	70			59	5	27
Pleurocera alveare (Conrad)		70	67	62	59	5	
canaliculatum moriforme (Lea)	72	70	67	62	59	5	27
canaliculatum filum (Lea)	72	70	67	62	59	5	27
canaliculatum excuratum (Conrad)	72	70	67	62	59	5	27
Goniobasis nassula (Conrad)			67	62	59	5	27
acuta (Lea)						5	27
interveniens Lea			67		59	5	
paupercula Lea		70	67		59		
Anculosa praerosa (Say)	72	70	67	62	59	5	27
tintinnabulum (Lea)				62		5	27
tryoni (Lewis)	72	70	67	62	59		
gibbosa (Lea)				62	59		
subglobosa (Say)			67	62	59		
Eurycaelon anthonyi (Budd)	72	70	67		59	5	27
Fossaria parva (Lea)					59		
Planorbula armigera (Say)					59		
Rhodacmea hinkleyi (Walker)	72	70	67	62	59		27
Physa species			67		59		

[1] 72=site Lu° 72; 70=site Lu° 70; 67=site Lu° 67; 62=site Lu^{v} 62; 59=site Lu° 59; 5=site Lu° 5; 27=site Ct° 27.

[2] Sphaeriidae; included here to complete the list of fresh-water mollusks found in the shell mounds.

TABLE 7.—*Occurrence of fresh-water snails in site Lu° 67*

Species	Foot level									
	0–1	1–2	2–3	3–4	4–5	5–6	6–7	7–8	8–9	9–10
Viviparus contectoides (W. G. B.)	2	5	28	20	32	------	3	90	------	84
Campeloma ponderosum (Say)	162	206	211	238	148	140	17	1,897	------	660
lewisi (Walker)	3	13	43	44	19	------	7	45	------	24
Amnicola olivacea Pilsbry	------	------	------	1	------	------	------	------	------	------
Somatogyrus aureus (Tryon)	------	1	------	------	------	------	------	------	------	------
humerosus Walker	------	4	------	1	------	------	------	2	------	------
excavatus Walker	------	1	------	------	------	------	------	1	------	2
strengi Pilsbry & Walker	------	1	------	------	------	------	------	------	------	------
Lithasia salebrosa (Conrad)	495	1,059	1,983	2,395	1,211	314	18	1,074	------	30
verrucosa (Raf.)	199	435	909	631	353	40	7	316	------	13
Pleurocera alveare (Conrad)	------	------	------	------	------	------	------	10	------	------
canaliculatum moriforme (Lea)	27	48	53	76	34	3	------	75	------	3
canaliculatum filum (Lea)	12	23	8	7	11	16	5	80	------	11
canaliculatum excuratum (Conrad)	72	59	44	70	69	28	8	203	------	9
Goniobasis nassula (Conrad)	------	1	3	1	------	------	------	------	------	------
interveniens Lea	------	------	------	------	------	------	------	2	------	------
paupercula Lea	------	2	------	------	------	------	------	------	------	------
Anculosa praerosa (Say)	521	1,017	1,796	1,338	853	114	17	500	------	16
tryoni (Lewis)	16	31	22	45	23	------	1	14	------	------
subglobosa (Say)	2	4	25	11	10	1	1	1	------	------
Eurycaelon anthonyi (Budd)	3	------	1	6	16	3	------	2	------	------
Rhodacmea hinkleyi (Walker)	------	------	1	------	------	------	------	------	------	------
Physa species	------	------	1	------	------	------	------	------	------	------

TABLE 8.—*Occurrence of fresh-water snails in site Lu° 59*

Species	Foot level																
	0–1	1–1½	1½–2P	1–2 P	2–3	3–4	4–5	5–6	6–7	7–8	8–9	9–10	10–11	11–12	12–13	13–14	14–15
Pisidium virginicum (Gmelin)	----	----	----	----	----	----	1	----	----	1	1	----	2	----	----	----	----
Viviparus contectoides (W. G. B.)	1	----	----	----	1	1	----	7	14	2	----	1	3	3	14	3	----
Lioplax subcarinata (Say)	----	----	----	----	----	----	----	----	----	----	----	1	----	----	----	----	----
Campeloma ponderosum (Say)	217	389	469	131	640	492	376	183	320	509	1,066	238	131	194	420	442	24
lewisi (Walker)	----	----	----	----	----	----	----	----	----	----	----	----	----	----	14	----	----
Amnicola olivacea Pilsbry	----	----	----	----	----	----	----	----	----	----	----	----	1	----	1	----	----
Somatogyrus aureus Tryon	----	1	----	----	----	----	2	1	----	----	1	----	----	----	----	----	----
humerosus Walker	2	8	3	2	2	1	28	27	4	2	30	3	13	4	4	8	----
excavatus Walker	7	2	4	1	1	----	6	14	2	6	12	2	4	3	----	----	----
strengi Pilsbry & Walker	----	3	1	1	----	----	1	1	1	1	2	----	----	----	----	----	----
Lithasia salebrosa (Conrad)	112	465	38	96	821	618	367	596	678	305	586	28	161	750	1,498	249	8
verrucosa (Raf.)	64	265	24	39	200	259	201	303	458	165	477	14	169	481	897	230	28
Strephobasis curtum (Hald.)	----	----	----	----	----	----	----	3	8	1	8	1	----	9	21	1	----
Pleurocera alveare (Conrad)	----	1	----	----	----	1	----	----	----	2	1	2	----	----	----	1	----
canaliculatum moriforme (Lea)	11	23	4	4	23	19	23	37	28	12	34	19	16	22	48	7	----
canaliculatum filum (Lea)	4	19	8	8	17	11	5	9	22	22	68	13	22	11	14	9	----
canaliculatum excuratum (Conrad)	23	49	12	47	75	50	29	38	65	49	170	74	40	33	88	12	2
Goniobasis nassula (Conrad)	----	14	2	2	8	3	7	6	15	4	15	2	1	2	13	6	----
interveniens Lea	----	----	----	----	----	----	----	----	2	----	----	----	1	2	1	----	----
paupercula Lea	----	----	----	----	2	1	----	----	----	----	1	----	2	6	----	3	----
Anculosa praerosa (Say)	162	544	22	33	348	562	647	952	1,815	467	866	51	577	1,593	2,075	327	9
tryoni (Lewis)	2	21	1	3	34	4	3	7	3	----	2	----	----	2	4	----	----
gibbosa (Lea)	----	----	----	----	----	----	----	----	----	----	----	----	----	5	19	16	1
subglobosa (Say)	----	1	----	1	1	1	2	7	10	7	----	----	2	2	4	----	----
Eurycaelon anthonyi (Budd)	----	----	----	----	2	1	1	----	----	1	----	----	----	----	----	1	----
Fossaria parva (Lea)	----	----	----	----	----	----	1	----	----	----	----	----	----	----	----	----	----
Planorbula armigera (Say)	----	----	----	----	----	----	----	----	----	----	1	----	----	----	----	----	----
Rhodacmea hinkleyi (Walker)	----	----	1	----	----	----	----	----	----	----	1	----	1	----	----	----	----
Physa species	----	----	----	----	----	----	----	----	----	----	----	----	----	----	1	1	----

NOTES ON SPECIES OF FRESH-WATER SNAILS

Pisidium virginicum (Gmelin).

This little "Pill clam" was undoubtedly carried into the mounds in mud stuck to some of the larger shells. Only a few specimens were seen, hence it is of incidental occurrence only.

Viviparus contectoides (W. G. B.).
Lioplax subcarinatus (Say).

Both of these species of snails were used as food whenever they were found. Primarily inhabitants of deep water, they were seen only occasionally in the shell deposits of these mounds.

Campeloma ponderosum (Say).

This large snail lives in mud bottoms, burrowing a little below the surface. Since it occurs in the marginal areas of mud in the Tennessee River, it was available in quantities for use as food by these Indians. The almost unbroken condition of many of the specimens, including the unbroken but thin lip of the younger individuals, and the finding of embryonic shells within some of the female specimens, is surprising. These snails were in use for food as soon as the shell deposits began to accumulate, but there is no positive indication as to just how they were cooked, unless possibly they were steamed in a pit beneath the fire. Very few of the shells among thousands of individuals seen were fire-marked, so we know they were not roasted over the fire.

Campeloma lewisi (Walker).

This is a more locally distributed species of the same general habits as *ponderosum;* it was found in only two of the sites studied, and then not in great numbers.

Amnicola olivacea Pilsbry.
Pyrgulopsis scalariformis (Wolf).
Somatogyrus aureus Tryon.
Somatogyrus humerosus Walker.
Somatogyrus excavatus Walker.
Somatogyrus strengi Pilsbry & Walker.

All these species are small, belonging to the family Amnicolidae, and were probably not even seen by the Indians. Their food value is negligible, since they are so small; their presence here is due to their being carried in while adhering to the mussel shells or to the stones from the river that were brought in in order to steam the mussels. The occurrence here of the little carinated *Pyrgulopsis* is interesting as a new locality record, and as a possible indication of the reason for such widely scattered records for the genus in the entire Mississippi Valley. If, since the time when they were found near the mouth of the Ohio, the Wabash, and the Tennessee, they have been advancing upstream with the change of river conditions to survive under their optimum ecological set-up, it is easy to see how at this later date, after the passage of an unknown amount of time, they were abundant in the upper Mississippi region at Tazewell County, Ill., on the Illinois River; in the Rock River in Rock Island County, Ill., in Pleistocene times; how later still they were up the Tennessee as far as mounds Lu° 72 and Lu° 27 when the Indians were eating mussels from the river; and how at the present time the genus is known living at the "Chains" of the Wabash, and at Mussel Shoals on the Tennessee. Hinkley collected these little snails in Shoals Creek near Florence, Ala., in 1904; they may be extinct at this locality on account of the change of water conditions brought about by the impounding of water behind Wilson Dam, but should be looked for in the lower parts of every tributary stream in the region if we are to know their whole story.

Angitrema armigera (Say).

Only one specimen of this species was seen, from the mound furthest upstream (site Ct° 27). If one specimen means anything, it probably occurred further upstream in numbers, or perhaps more likely occurred on the rocks in the main river channel and was hence ordinarily out of reach of these Indians.

Lithasia salebrosa (Conrad).

Very abundant and extremely variable in this material. See remarks under the next species.

Lithasia verrucosa (Raf.).

Very abundant and extremely variable. Found in all of the mounds studied, usually in numbers. The two species of *Lithasia* present in the Tennessee River in this area present a problem all their own of variation and speciation. Almost every form that has been recorded or described from this region has been seen in the great amount of material belonging to the genus *Lithasia* from the mounds studied. These "forms" are connected by intergrades into two complete series; each series ranging from small sizes to larger and even giant ones, and from smooth individuals to those that are highly sculptured.

The series typified by *salebrosa* contains many large specimens, extremely variable in number, size, and prominence of the tubercles on the upper shoulder of the whorl. An intermediate, globular form is present in the middle of the range, with few small tubercles, or none. This phase has received the name of *subglobosa*. The smooth individuals of this series vary from excessively short to a form a little longer than the named elongate (*nucleola*) phase.

The second series, that of *verrucosa*, shows three highly sculptured phases: *lima*, with the tubercles large, prominent and somewhat irregular; typical *verrucosa*, whose most abundant form has three subequal rows of tubercles; and *curta*, of an excessively short, globular appearance. Every sort of variation has been seen in the intergrading specimens that possess only part of the typical sculpture. Among these phases are the named forms *wheatleyi* and *duttoniana.* The smooth individuals are mostly small in the material seen from these mounds, the smallest probably of the form doubtfully called *carinata* by Hinkley (1906, p. 42), with larger individuals that agree with *florentina* and *venusta* in appearance. While no giant individuals of *tuomeyi* and *imperialis* were found, it is evident these two named phases belong here. It is even difficult to separate the smallest smooth individuals of the two series from each other, unless particular attention is given to the thickness of the callus deposit on the columella. Some hint of the extent to which the natural populations have been individually "split" in the past may be gotten from the following quotation from Lea, found on page 17 of Tryon's Monograph of the Strepomatidae:

> This species [*tuomeyi*, one specimen!] and *imperialis* [one specimen!] were accompanied by many specimens of *semigranulosa* (*verrucosa*) and *florentiana.*

With the intergrades before us, and the knowledge as to just how primitive the structure of the reproductive organs of the family really is, we can get a clearer picture of the actual biology of these snails, and with it something of their genetic lack of fixation. There must be genetic factors involved because nearly all of the phases may be found at one locality, as evidenced by the mixtures in the shell-mound deposits. Another feature that would argue for the production by genetic action of some of these phases within a species, is their occurrence, in some cases, in more or less constant proportionate numbers, in the total population.

Strephobasis curtum (Hald.).

Not numerous in individuals, and those scattered through most of the mounds studied. This is one of the species of secondary importance in regard to food value.

Pleurocera alveare (Conrad).

Present only sparingly in the mounds. It was recorded from the Tennessee River, Cypress and Shoal Creeks, at Florence, by Hinkley (1906, p. 41)—another species of secondary importance.

Pleurocera canaliculatum moriforme (Lea).
Pleurocera canaliculatum filum (Lea).
Pleurocera canaliculatum excuratum (Conrad).

The "*canaliculatum* complex," as seen in this material coming from the Tennessee River, presents the same problems as does the genus *Lithasia.* There are perhaps a dozen names applicable to individuals of this complex from this area. For convenience in this study, the three most prominent forms, listed above, were separated. In most of the samples counted, it is evident that these races are present in more or less constant proportions, in the total *Pleurocera* population. Students of genetics will find unparalleled opportunity here; however, these problems will require vast amounts of material and much patient work for their complete solution.

Goniobasis nassula (Conrad).
Goniobasis acuta (Lea).
Goniobasis interveniens Lea.
Goniobasis paupercula Lea.

Goniobasis is a genus of smaller (tributary) streams, so it is evident that the few specimens found in most of the mounds studied indicate the occurrence of these species as scattered individuals in the Tennessee River. The samples from the mound at site Ct° 27 contained numerous individuals of *acuta*, however. The source of these was Mulberry Creek, which flows by the edge of the mound site, and which still maintained the species a short distance above its mouth in December 1937, when the field work on these mounds was done. The specimens of *acuta* discovered in the mound across the river (site Lu° 5) may have been picked up as stragglers in the river, or they may have been gathered in Mulberry Creek, and carried across to the opposite side.

Anculosa praerosa (Say).

This species is one of primary importance for food value, as shown by its general and sometimes extreme abundance in these shell-mound deposits. As seen here in numbers, it is typical in shape, though variable, but a little small for the species as seen from the Ohio River. According to the story written in these mounds, it is replaced in an upstream direction here by the following species.

Anculosa tintinnabulum (Lea).

Only one specimen was seen in site Lu^v 62, while many were in the samples from the mounds at site Lu° 5 and site Ct° 27, the two sites furthest upstream that were studied. In these two last-mentioned mounds it supersedes *praerosa* as the most abundant form of the genus. As found in this area it is a large, irregularly humped or angled shell with the spire exserted in the shape of an outside (helical) staircase. The adults, some of whom are as large as small adults of *Campeloma ponderosum* or the same size as *Eurycaelon anthonyi*, are clearly distinguished from *praerosa* individuals by the exserted spire and the obsolete angulation of the body whorl, above and below. Not enough young were seen and studied to completely confirm Walker's observations (1908, p. 110) on the immature shells.

Anculosa tryoni (Lewis).

This is a distinct species when clearly understood. It occurs only sparingly in these mounds. It may be easily separated from *praerosa* by the non-sinuous outer lip, and by the faintly angled basocolumellar part of the aperture. Usually there is an indistinct or obsolete internal sinus at this point, also.

Anculosa gibbosa (Lea).

Not very many specimens of this large inflated form were found in the shell mounds studied. Not enough is known of the ecology of the species to say why it was discovered in only the lower layers of the mound at site Lu° 59, unless possibly it is primarily a deeper-water inhabitant.

Anculosa subglobosa (Say).

Only a few individuals of this species were found scattered through the samples studied. It is seen here in a small, slight, neritiniform phase, much flattened above, with a heavily calloused, almost circular aperture.

Eurycaelon anthonyi (Budd).

The few individuals of this species found indicate a straggling appearance in the shallower water, as if they primarily inhabited deeper water in this section of the Tennessee River. In this connection, compare Tryon's remarks (1873, p. 348) on its habitat.

Fossaria parva (Lea).

Planorbula armigera (Say).

Rhodacmea hinkleyi (Walker).

Physa species.

These four fresh-water pulmonates are only incidental to the shell-mound deposits. They were accidentally carried in from the river, in the course of the gathering of larger shells for food. In the case of the little fresh-water limpet (*Rhodacmea*) it was actively adhering to either some of the mussel shells brought in for food, or to the stones carried up from the river bed to be used in steaming those mussels open before they were eaten. Because of its active part in the process, this limpet is the most consistent in occurrence of these "incidental species."

LAND SNAILS

Table 9 shows a list of the land snails recorded by Walker (1928) or personally collected in the Florence-Tuscumbia area. The arrangement of species follows that of Walker's monograph, except for the family Polygyridae, brought into agreement with Pilbry's North American Land Mollusca (1940), and the family Zonitidae, which is changed to conform to H. B. Baker's check list (1933). Of a total of 81 land forms (species and subspecies) known from this region, 43 were included in the mollusks recovered from the Indian shell mounds of the Pickwick Landing Basin. In this table, the various mounds from which each species has been seen are noted. Those unknown from the mounds (primarily upland-inhabiting species) are so indicated.

TABLE 9.—*Land-snail distribution in shell mounds*

Species		Site [1]						
Pomatiopsis lapidaria (Say)			70					
Oligyra orbiculata (Say)	[2] U							
Polygyra pustuloides (Bland)	U							
leporina (Gould)			70					
plicata Say	U							
troostiana Lea						59		
Stenotrema spinosum (Lea)	U							
barbigerum (Redfield)	U							
stenotrema (Pfr.)	U							
stenotrema seminudum (Clapp)	U							
hirsutum (Say)			70			59		
hirsutum barbatum (Clapp)	U							
exodon (Pilsbry)	U							
monodon aliciae (Pilsbry)	U							
Mesodon thyroidus (Say)		72	70	67	62	59	5	27
clausus (Say)		72	70	67	62	59	5	27
zaletus (Binney)	U							
elevatus (Say)				67		59	5	27
appressus (Say)	U							
inflectus (Say)		72	70	67	62	59	5	27
Triodopsis tridentata (Say)	U							
fraudulenta vulgata Pilsbry				67		59		
notata (Deshayes)		72		67	62	59	5	
obstricta (Say)	U							
carolinensis (Lea)	U							
albolabris (Say)	U							
Guppya sterkii (Dall)	U							
Euconulus chersinus (Say)						59		
Retinella circumstriata (Taylor)	[2] U							
lewisiana (Clapp)		72	70			59	5	27
indentata (Say)		72	70	67	62	59	5	27
carolinensis (Ckll.)	U							
carolinensis wetherbyi (Ckll.)	U							
cryptomphala (Clapp)			70		62	59		27
Mesomphix cupreus (Raf.)		72	70	67	62	59	5	27
perlaevis vulgatus H. B. B		72	70	67	62	59	5	27
Paravitrea capsella (Gould)	U							
andrewsae (W. G. B.)	U							
multidentata (Binney)	U							
Hawaiia minuscula (Binney)		72	70	67	62	59	5	27
Striatura milium (Morse)						59		
meridionalis (Pils. & Ferr.)	U							
Gastrodonta interna (Say)								27
Clappiella aldrichiana (Clapp)		72	70	67	62	59	5	27
Ventridens suppressa (Say)	U							
gularis (Say)	U							
ligera (Say)		72				59	5	
demissa (Binney)	U							
intertexta (Binney)	U							
Zonitoides lateumbilicatus (Pilsbry)	U							
arboreus (Say)		72	70	67	62	59	5	27
Anguispira alternata carinata (Pils. & Rh.)	U							
alternata crassa Clapp	U							
alternata palustris Clapp		72	70	67	62	59	5	27
Discus patula (Deshayes)			70	67	62	59	5	27
Helicodiscus parallelus (Say)		72	70	67	62	59	5	27
singleyanus inermis H. B. B		72	70	67	62	59	5	27
Helicodiscus intermedius Morrison		72	70	67	62	59	5	27
Punctum minutissimum (Lea)			70	67		59	5	27
vitreum H. B. Baker			70			59		
blandianum Pilsbry	[2] U							
Haplotrema concavum (Say)		72	70	67	62	59	5	27
Gastrocopta armifera (Say)		72	70	67	62	59	5	27
contracta (Say)		72	70	67	62	59	5	27
tappaniana (C. B. Ads.)	U							
pentodon (Say)							5	
pentodon gracilis (Sterki)						59	5	27
corticaria (Say)						59		
procera (Gould)						59	5	27

[1] 72=site Lu° 72; 70=site Lu° 70; 67=site Lu° 67; 62=site Lu° 62; 59=site Lu° 59; 5=site Lu° 5; 27=site Ct° 27.

[2] U=recorded from the Florence area, but not found in the mounds. These are mostly upland species.

TABLE 9.—*Land-snail distribution in shell mounds*—Continued

Species		Site[1]						
Vertigo oralis Sterki	------	------	------	------	------	59	------	------
ovata Say	[2] U	------	------	------	------	------	------	------
tridentata Wolf	------	------	------	------	------	59	------	------
Pupoides marginatus (Say)	------	------	------	------	------	59	5	27
Strobilops aenea Pilsbry	------	------	70	67	------	59	------	------
texasiana floridana Pilsbry	U	------	------	------	------	------	------	------
Cochlicopa lubrica appalachicola Pilsbry	U	------	------	------	------	------	------	------
Succinea concordialis Gould	U	------	------	------	------	------	------	------
avara Say	------	72	70	67	------	------	5	27
Carychium exiguum (Say)	------	------	------	------	------	59	------	------
exile H. C. Lea	------	------	70	67	------	59	5	27
nannodes Clapp	U	------	------	------	------	------	------	------

[1] See footnote 1, p. 374.
[2] See footnote 2, p. 374.

Of course, many of the species recorded from these shell deposits are ecologically tolerant, and may be found in many types of land molluscan habitats. Such species as *Mesodon thyroidus*, *Mesodon clausus*, and *Zonitoides arboreus*, for example, may be found anywhere between a forested river's edge and the open grassy slopes of a railroad embankment. There are probably about 25 such tolerant or ubiquitous forms in our list of 43 species from the mounds.

On the other hand, this faunal list of land snails plainly indicates its affinities by the inclusion of such forms as *Anguispira alternata palustris*, which Walker (1928, p. 113) says has never been found above the flood plain. Other species that indicate this habitat as a forested flood plain are: *Pomatiopsis lapidaria*, *Hawaiia minuscula*, *Clappiella aldrichiana*, *Helicodiscus intermedius*, *Gastrocopta pentodon gracilis*, and *Gastrocopta corticaria*.

Approaching this problem from the upland side, we find only one specimen of *Gastrodonta interna* present in the mound at site Ct° 27, to mar an otherwise perfectly recorded absence of those species known primarily as upland forms. Such species as *Polygyra plicata*, *Stenotrema spinosum*, *Stenotrema barbigerum*, *Triodopsis carolinensis*, *Retinella circumstriata*, *Ventridens gularis*, and *Ventridens suppressa*, are present in the Florence area, in abundance in upland habitats, yet were not to be found in these shell mounds. To be specific, *Stenotrema spinosum*, *Triodopsis carolinensis*, and *Gastrodonta interna* were personally collected (the first and third in abundance) at the edge of the limestone upland slopes, living just one-third mile north of site Lu° 59, but were not found in any of the 18 samples taken from that mound. *Triodopsis notata*, which is easily mistaken for it on superficial examination, seems to replace *T. carolinensis* on the Tennessee River flood plain.

TABLE 10.—*Occurrence of land snails in site Lu° 59*

Species	Foot level																
	0–1	1–1½	1½–2P	1–2P	2–3	3–4	4–5	5–6	6–7	7–8	8–9	9–10	10–11	11–12	12–13	13–14	14–15
Polygyra troostiana Lea	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	1	----
Stenotrema hirsutum (Say)	----	----	----	----	----	----	----	----	----	----	----	----	----	----	1	----	----
Mesodon thyroidus (Say)	2	4	10	----	6	50	26	17	----	12	20	14	15	4	13	3	----
clausus (Say)	2	4	1	1	7	25	20	7	24	13	8	22	14	4	23	28	----
elevatus (Say)	----	2	----	----	----	34	10	----	11	3	8	5	----	----	1	----	----
inflectus (Say)	----	6	8	10	6	18	4	----	8	11	28	12	41	2	46	29	----
Triodopsis fraudulenta vulgata Pilsbry	5	2	----	----	----	16	----	2	1	12	----	3	11	6	----	----	----
notata (Deshayes)	----	----	----	1	1	6	3	----	----	----	----	12	5	----	3	3	----
Euconulus chersinus (Say)	----	----	----	----	----	1	----	----	----	----	----	----	----	----	----	----	----
Retinella lewisiana (Clapp)	1	7	7	11	----	3	----	1	4	2	3	----	----	----	----	----	----
indentata (Say)	----	----	1	----	----	8	8	----	17	83	85	35	101	10	64	44	----
cryptomphala (Clapp)	1	----	3	23	----	55	2	----	3	15	19	21	36	3	8	13	----
Mesomphix cupreus (Raf.)	2	----	2	----	2	8	8	2	11	11	9	2	9	----	3	1	----
perlaevis vulgatus H. B. Baker	----	2	----	----	1	46	8	----	12	25	----	3	17	6	16	14	1
Hawaiia minuscula (Binney)	10	20	39	18	1	96	26	8	17	42	53	6	110	8	76	204	4
Striatura milium (Morse)	----	----	----	----	----	3	----	----	----	----	3	----	----	----	1	2	1
Clappiella aldrichiana (Clapp)	----	----	----	----	----	----	----	----	----	2	2	----	15	----	3	4	----
Ventridens ligera (Say)	----	----	3	----	----	2	1	----	----	----	----	----	----	----	4	----	----
Zonitoides arboreus (Say)	----	6	128	68	7	10	12	13	22	21	94	28	51	19	97	91	----
Anguispira alternata palustris Clapp	3	36	34	23	47	161	156	26	48	58	155	118	246	20	130	130	1
Discus patula (Deshayes)	----	----	1	----	----	----	----	1	2	----	----	----	----	----	9	32	----
Helicodiscus parallelus (Say)	----	6	2	5	----	1	4	1	12	65	70	33	101	6	57	167	----
singleyanus inermis H. B. Baker	----	----	----	14	11	36	25	11	3	18	40	14	32	22	147	25	----
intermedius Morrison	63	165	228	60	5	115	87	18	109	267	827	20	413	105	1,432	374	9
Punctum minutissimum (Lea)	----	----	----	----	----	10	1	----	----	2	----	----	1	1	1	1	----
vitreum H. B. Baker	----	----	----	----	----	----	----	----	----	----	----	----	----	----	1	----	----
Haplotrema concavum (Say)	----	----	----	----	----	12	----	1	7	12	1	7	14	5	11	6	2
Gastrocopta armifera (Say)	2	----	----	----	----	61	18	2	2	27	71	1	3	4	1	1	----
contracta (Say)	4	1	42	7	3	97	34	3	23	303	129	3	159	8	111	243	5
pentodon gracilis (Sterki)	----	----	----	----	----	1	1	----	1	1	----	----	----	----	----	----	----
corticaria (Say)	----	----	----	----	----	1	----	----	----	----	----	----	----	----	----	----	----
procera (Gould)	3	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
Vertigo oralis Sterki	----	----	----	----	----	1	----	----	----	2	----	----	----	----	----	----	----
tridentata Wolf	----	----	----	----	----	2	1	----	----	----	1	----	----	----	----	2	1
Pupoides marginatus (Say)	----	----	----	----	----	----	----	----	----	----	----	----	1	----	----	----	----
Strobilops aenea Pilsbry	----	----	----	----	----	----	----	----	----	2	3	----	----	----	1	1	----
Carychium exiguum (Say)	----	----	----	----	----	----	----	----	----	1	----	----	----	----	----	----	----
exile H. C. Lea	----	----	----	----	----	2	2	----	8	22	1	----	3	2	7	10	----

When we understand that our list of land snails is only that of a forested flood plain, we have immediate proof that the Indians did not gather and carry in any of the land snails. The small total numbers of individuals and fragments also argues against their use as food. Therefore, the land-snail species present in these mounds are prima facie evidence of conditions on or immediately surrounding the mounds, on the river's edge.

The quantitative analysis of the land snails has been completed for only one of the sampled mounds, site Lu° 59. These results are incorporated into table 10, in which the number of specimens actually found in each (foot-level) sample is recorded.

NOTES ON SPECIES OF LAND SNAILS

Among the land snails found in the mounds there were some puzzling forms, on which the following notes and descriptions are primarily based.

Triodopsis tridentata (Say).

The form of this species collected on the rocky bluff on the east side of a tributary of Shoal Creek, in the northeast corner of sec. 4, T. 2 S., R. 10 W., about 8½ miles northeast of Florence, Lauderdale County, Ala., differs from all the descriptions in the possession of hirsute epidermis when young. The setae are minute, narrow threads as in *Stenotrema stenotrema,* set in regular rows about as distant as, but a little more nearly perpendicular than, the growth ribs. The rows of setae thus do not quite coincide with either the ribs or the intervening grooves. This species is here ecologically restricted to the upland, and was not seen in the mounds.

Clappiella aldrichiana (Clapp).

The finding of more than 500 specimens of this little-known species in the shell mounds was a welcome surprise. Hitherto known only from 4 examples collected from 4 different localities by H. H. Smith, the examination of this amount of new material has cleared up some questions in regard to its shell structure.

The exterior of the shell is as described by Clapp (1928 p. 84), with the following additions: Full-sized adults (from the 3- to 4-foot level of the mound at site Lu° 5) measure 2.9 mm. in maximum diameter and 1.2 mm. in height. The figure given by Clapp is misleading as to the height of the spire; *aldrichiana* is nearly plane above, appearing much like a miniature *Helicodiscus parallelus.* In basal view, the umbilicus is widely funicular, with a flat bottom; the base of the body whorl is rounded near the umbilicus and peripherally, but, nevertheless, distinctly flattened so as to suggest its continuity in a single plane. The aperture of some adult shells is slightly flared peripherally, as in fully adult shells of *Paravitrea multidentata.*

The internal armature as seen in many specimens is, as suggested previously, composed of an alternating pattern of barriers. The parietal barriers are double, with the upper end slanted or bent toward the aperture; the basocolumellar barriers (not noticed by Clapp in fresh, semitransparent shells) are smaller than those of *saludensis*, reduced to low, subacute points directed upward and toward the aperture. They arise from the margin of a more or less continuous basal callus, and give this callus a scalloped appearance, when seen from above in broken shells.

The possession of such a distinct, alternating pattern of internal barriers seems to the writer to necessitate the separation of this group from *Gastrodonta* as a distinct genus. As now known, it must be a valley or cove species, since such ample confirmation of its occurrence on the flood plain is found in the mound material. Its occurrence as far west as 4 miles west of Waterloo, Lauderdale County (in site Lu° 72), suggests that it has a wider distribution than previously suspected.

Helicodiscus (Hebetodiscus) intermedius, new species.

Shell minute, widely umbilicate, somewhat planorboid; the spire regularly but slightly raised in a very low arch; somewhat translucent, light yellowish horn, shining; growth wrinkles obsolete; whorls about five, regularly increasing, well rounded, separated by distinct but shallow sutures. Aperture proportionately small, lip thin, simple, and rather regularly arched from spire to umbilicus. Umbilicus wide, showing all the whorls, and about one-third the shell diameter.

The type, U. S. N. M. No. 535599, was selected from many specimens recovered from the 10–11-foot sample of the mound at site Lu° 59, on the Tennessee River flood plain in Lauderdale County, Ala. The type measures: Height 1.3 mm.; greater diameter, 2.5 mm.; lesser diameter, 2.2 mm.; aperture height, 1.0 mm.; aperture diameter, 0.95 mm.; umbilical diameter, 0.7 mm.; whorls, 4½. The diameter of the nuclear whorl is 0.4 mm., seen from above.

This minute species has possibly been overlooked, confused with *singleyanus inermis*, but differs from it by its constantly smaller size and the presence of constantly strong, but very fine spiral striations. Also, the nuclear whorl of *inermis* from the same sample is 0.5 mm. in diameter as against 0.4 mm. for the diameter of that whorl in *intermedius*. It is easily distinguished from *Hawaiia minuscula* by the more regularly arched low spire, the shallower sutures, and the absence of prominent growth wrinkles. The examination of a few thousand dead and a few fairly fresh specimens in the course of this study has clearly demonstrated the specific distinction of *intermedius* from all other forms known from this north Alabama region. Its ecology may be judged as that of a deep-soil form, since some fresh-appearing shells were seen as deep as 12 feet in the mound at site Lu° 59. While it may seem folly to cite as a type locality a spot that has already been destroyed for this species, the writer has no choice. No specimens other than those from these shell mounds have been seen. On the other hand, *intermedius* may already have been rediscovered in other localities on the Tennessee River flood plain.

In the course of a search for the affinities of *intermedius*, the following new form was discovered in the United States National Museum collections.

PSEUDISCUS, new subgenus.

Shell *spirally punctate, from the apex onward;* subdiscoidal, with sutures moderately impressed; aperture somewhat sinuous; the parietal callus thin but distinct and continued forward a little beyond the rest of the aperture margin, on the preceding whorl.

Genotype: *Helicodiscus* (*Pseudiscus*) *punctatellus*, described herewith.

Helicodiscus (Pseudiscus) punctatellus, new species.

Shell small, whitish, subdiscoidal, with 4½ well-rounded whorls separated by a moderately deep suture above and below. Apex furnished with punctae arranged in spiral rows which continue in slightly, but gradually decreasing prominence over the later whorls. The sculpture of the upper portion of the body whorl is closely spaced, as if it consisted of growth wrinkles and spiral lirae of equal size and prominence, with the punctae representing the interstices not filled out to the level of the shell surface. The spiral punctae become obsolete midbasally on the whorls, not extending into the umbilicus which is narrowly perspective, about ⅓ the diameter of the shell, and exhibits all the whorls to the apex. Aperture sublunar, oblique, somewhat sinuous, with the parietal callus advanced a little upon the preceding whorl. In basal view, the aperture is almost evenly elliptical. Lip thin, but a little thickened within in the umbilical region as in *singleyanus*, *inermis*, *intermedius*, and *nummus*.

The type, U. S. N. M. No. 535600, was collected August 16, 1929, at Station 74 (Ky. Geol. Survey), near White's Cave, near Mammoth Cave, Ky., by L. Giovannoli, and measures: Height, 1.8 mm.; greater diameter, 3.4 mm.; lesser diameter, 3.0 mm.; aperture height, 1.1 mm.; aperture diameter, 1.4 mm.; umbilical diameter, 1.0 mm.; whorls, 4.6. The nuclear whorl is 0.5 mm. in diameter, seen from above.

Four paratypes, U. S. N. M. No. 381402, from the original lot, are included in the National Museum collections. This species simulates a large, slightly high-spired form of *Helicodiscus singleyanus*, but the sculpture is at once distinctive. The group *Pseudiscus* is not to be confused with *Miradiscops* H. B. Baker, 1925, in which the pits are not spirally arranged.

SUMMARY

SPECIES PRESENT IN MOUNDS

From all indications, the shell mounds studied were contemporaneous with each other. Of course, some were not inhabited as continuously, as early, or as late, as others, and are hence not as thick in shell deposit. In addition to the question of the length of time these mounds were inhabited, a variable rate of shell deposition contributes to the difference in thickness of different mounds. From the way in which the shell was accumulated, bit by bit, there is no way of telling how many people lived on the mound site at any one time. A larger population, subsisting on this molluscan food supply, would accumulate a thicker layer of shell refuse than a smaller group would in the same time interval. Variability of water level in the Tennessee River must also be taken into account as a factor in the variable rate of shell accumulation, on account of the difference a very few feet in lowered level of the river would make in the number of species and of individuals of mollusks available for food. The presence in the shell mounds of a complete land-snail fauna proves that they were seasonally or otherwise intermittently inhabited, and with an unknown fraction of each year as the actual habitation time here, brings another variable into the picture. The association of this land-snail fauna in close proximity to charcoal (ashes) necessitates an interval of time before the snails could live (in nearly all levels) at the same spot in the middle of the mound site. All these factors contributed not only to the variability in total thickness of the different shell mounds, but as well to the variability of concentration of shell in the different levels of each site.

Out of a known fresh-water-mussel fauna of 79 forms from the Tennessee River in this region, 56 were found in the shell deposits of the 7 mound sites studied. Thirty-three fresh-water forms other than mussels are also present. In addition to these species, most of which were used as food, 43 of the land snails known from the area were found in these shell deposits. There are a total of 81 land forms of mollusks known from this region. How complete a picture one mound can give us, may be demonstrated by table 11, in which it is seen that the mound at site Lu° 59 (the largest one studied, and the only one completely so) contained almost all the molluscan species found in the whole group of mounds. The samples from site Lu° 59 contained 52 mussel species; 29 other fresh-water species; and 38 land species; a total of 119 species of mollusks, represented by more than 57,000 specimens. It is believed that the method of sampling used recovered nearly all the mollusk species present. In the sampling of site Lu° 59, less than 25 cubic feet of material was studied, into which was packed that total of more than 57,000 individual shells. If the mound at site

Lu° 59 is more than 300 feet long, more than 150 feet wide, and 15 feet thick, as measured, how long did it take the Indians to accumulate the total number of shells in the whole mound?

TABLE 11.—*Number of species and specimens by levels in site Lu° 59*

Foot level	Mussels		Fresh-water snails		Land snails		All mollusks	
	Species	Specimens	Species	Specimens	Species	Specimens	Species	Specimens
0-1	13	56	11	605	12	98	36	759
1-1½	36	1,548	15	1,805	13	261	64	3,614
1½-2P	39	3,215	13	589	15	509	67	4,313
1-2 P	37	2,688	13	368	12	241	62	3,297
2-3	29	437	15	2,175	12	97	56	2,709
3-4	27	388	15	2,024	29	871	71	3,283
4-5	26	360	17	1,701	22	457	65	2,518
5-6	32	485	16	2,191	15	113	63	2,789
6-7	36	884	16	3,445	21	345	73	4,674
7-8	32	1,135	17	1,556	26	1,032	75	3,723
8-9	40	1,832	19	1,671	22	815	81	4,318
9-10	34	918	14	449	19	359	67	1,726
10-11	32	658	17	1,146	22	1,398	71	3,202
11-12	32	602	17	3,122	18	235	67	3,959
12-13	40	1,932	18	5,136	27	2,265	85	9,333
13-14	30	585	16	1,316	25	1,424	71	3,325
14-15	10	22	6	72	4	17	20	111
Total	52	17,745	29	29,371	38	10,537	119	57,653

SPECIES USED FOR FOOD

Seventy-eight of the forms of mollusks found in these mounds were evidently used for food. This includes the 56 kinds of mussels and the 22 larger varieties of fresh-water snails. The mussels were steamed open for eating, as proven by the quantities of water-cracked rock fragments that were present in the shell deposits. These rocks were river cobbles, brought in by the Indians, and heated by them in a fire, before the mussels were placed over the rocks for cooking. They must have been used over and over again, as the pieces remaining are small, having been split apart many times by the action of the water and juices coming from the mussels. The snails were probably not roasted over the fire, as very few shells among the thousands examined were charred. They may have been steamed in pits beneath the fire. If, as was very probable, the animal was extracted from the snail shell, this was done without breaking the discarded shells. There is no indication whatever that any of the land snails, even those living on the mound sites, were used as food.

SPECIES USED AS ORNAMENTS

Only a few instances of the use of the mollusk shells for anything other than food were found in the samples taken from these mounds. There were no tools of any sort made of shells found. In all the seven mound sites studied, only six specimens of shell ornaments were found.

One mussel-shell ornament, a ringlike punctured disk, was found in the 2- to 3-foot level of the mound at site Ct° 27. Six specimens of *Anculosa praerosa* (a rounded fresh-water snail) were found ground off as if for use as beads or buttons. The grinding away of a portion of the body whorl of these shells on the aperture side, produced a semispherical buttonlike bead(?), with a strong bar (the columella) within, by means of which it might have been strung as a bead or sewed onto clothing as a button or ornament. That the grinding of these shells was not accidental is proven by the absolutely plane surface remaining where the shell was cut away. No other part of the shell was altered in the grinding process. These five specimens were found as follows: Two from the 3- to 4-foot level of site Lu° 72; one from the 3- to 4-foot level in Lu° 70; one from the 3- to 4-foot; and one from the 7- to 8-foot level of site Lu° 67.

Ecology of the Molluscan Fauna

The inclusion in these shell mounds of only a part of the mollusk fauna of the Tennessee River was the result of the ecological preferences of the species of mollusks. The Indians gathered everything in their sight that was available for food, but, needless to say, did not see or get the species that were restricted in habitat to the deeper waters of the river. The species of fresh-water mollusks present indicate their source as the shoal waters of the Tennessee River, from the area immediately surrounding the mound site in each case.

Indicated Fresh-Water History

More complete analysis of the list of fresh-water mollusks of all types present indicates a slight faunal change here, without the extinction of any species since the shell mounds were built up. According to these indications, this stretch of the Tennessee River west of Florence was more nearly like the Mussel Shoals faunistically than it is today. In other words, the Colbert Shoals area maintained a fauna of mollusks almost identical to that now known for Mussel Shoals, at the time these mounds were forming. Thus, there has been a slight but general upstream retreat of the typical "Shoals Fauna," in the time interval between the occupation of these mound sites, and the studies of the mounds made by the white man.

Indicated Land History

The species of land snails found in these mounds represent only those forms living in the flood plain or river-bottom forest. The number of specimens present indicates that these mounds were accumulated in a forest area, probably cleared only where inhabited, on the edge of the Tennessee River. A marked change in the abundance of both species and specimens of land snails at a level 3 feet below the surface, indicates a partial clearing of the surrounding forest. These figures for the land snails may be seen in table 11. Such a partial forest removal means that at this level in the mound accumulation (history), there was either the beginning, or a marked increase in the amount of agriculture carried on by these peoples, or that at this period the habitation of the sites changed to become more continuous, as contrasted with the previous more intermittent occupation.

In the case of the mound at site Lu° 5, the more recent molluscan history of the site is told in the 0- to 1-foot layer sample; that the forest was completely removed, and grassland or glade conditions prevailed thereafter. This is proven by the presence of only a few dead shells of *Punctum minutissimum*, *Gastrocopta pentodon*, and *Carychium exile*, typical of oak deciduous-forest leafmold; by the presence of many, mostly dead shells of *Gastrocopta contracta*, which usually lives in leafmold and under logs, in forests; by the presence of many fresh shells of *Gastrocopta armifera*, usually found in open grassy or rocky habitats; and by the appearance of many fresh specimens of *Gastrocopta procera* and *Pupoides marginatus*, both typical of open grassland habitats. Since these last two named species are not found in quantity at any deeper levels in this or any of the other mounds studied, their presence at this spot may be explained as a recent introduction by the white man's agency, since the American Indians did not cart hay, etc., around for horses they did not have. Very likely the introduction of these two species occurred here during the years that the mounds at site Lu° 5 and site Ct° 27, on opposite sides of the river, were in use as ferry landings (Smithsonia and Newport Landings).

CONCLUSIONS

1. The shell mounds of the Pickwick Basin, though variable, are approximately contemporaneous.
2. These mounds were inhabited seasonally or intermittently.
3. Fifty-six kinds of mussels and twenty-two kinds of fresh-water snails were eaten by the inhabitants.
4. The shells were not used for any purpose (with the exception of 6 ornaments out of 100,000 specimens).
5. The major fraction of the total regional molluscan fauna included indicates shoal conditions in the Tennessee River, and a forested flood plain surrounding the sites.
6. There has been a slight but general upstream retreat of the fresh-water fauna of the Tennessee River in the time interval between the mound occupation and the present.
7. The land-snail fauna included reflects the history of the mound's surroundings: Forested; later partly cleared; and finally completely cleared by the white man in recent years.

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PRELIMINARY REPORT ON THE SKELETAL MATERIAL FROM PICKWICK BASIN ALABAMA

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PRELIMINARY REPORT ON THE SKELETAL MATERIAL FROM PICKWICK BASIN, ALABAMA

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INTRODUCTION

Acknowledgments

Owing to the exigencies of time, not all the excavated skeletal material from Pickwick Basin could be included in this report. Every effort was made, however, to include as much skeletal data as possible. One of us (Newman), took full measurements and observations on all crania restored by January 1939, and a selected number of measurements were taken on other cranial series which were processed by the end of March 1939.[1] Almost all the task of describing the postcranial skeletons fell to Dr. Charles E. Snow. The synthesis and interpretation of all these data were made by Newman, with many helpful suggestions by Snow.

We are indebted to a number of organizations and individuals in the course of our work on the Pickwick Basin skeletal material. For the privilege of pursuing these researches we are indebted to the Social Economic Research Division of the Tennessee Valley Authority and to the Central Archaeological Laboratory in Birmingham, a division of the Alabama archeological project, supported in part by the Works Progress Administration and sponsored by the Alabama Museum of Natural History. All the skeletal material was restored in the Central Archaeological Laboratory under the direct guidance of one or the other of us, ably assisted during the summer of 1938 by Mr. Martin Sweets, of the University of Kentucky, who kindly volunteered his services. To the workers in the laboratory we wish to express our gratitude for their painstaking labors.

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[1] The series from site Lu° 25 were measured by Snow.

We are especially grateful to Prof. W. S. Webb, of the Department of Anthropology and Archaeology of the University of Kentucky, under whose direction one of us (Newman) has done this work. We both deeply appreciate Professor Webb's unfailing cooperation and kindness from the inception of this project. Professor Webb, J. R. Foster, junior archeologist to the Tennessee Valley Authority, and Miss Marion Dunlevy, director of the Central Archaeological Laboratory, have all been extremely kind in furnishing us with the pertinent archeological information bearing directly upon the skeletal material.

To Prof. E. A. Hooton and Dr. Clyde Kluckhohn, of the Division of Anthropology of Harvard University, we are indebted for many things. Professor Hooton kindly loaned us anthropometric instruments for the prosecution of our researches, made his statistical laboratory available to us, and even had his experts calculate the statistical constants on a large part of our data. He was also kind enough to appraise the pathological material. The suggestions of Professor Hooton and Dr. Kluckhohn have been invaluable throughout the writing of this report. Further, they have both been extremely kind in consenting to criticize the manuscript. To Mr. Donald Scott, director of the Peabody Museum of Harvard University, we are greatly indebted for favors rendered. We also wish to thank Dr. S. B. Wolbach and Dr. H. S. Bennett, of the Harvard Medical School, and Dr. M. C. Sosman, of the Department of Roentgenology of Peter Bent Brigham Hospital, for their painstaking assessment of the pathological conditions present in some of the skeletal material.

To Dr. G. K. Neumann we owe thanks for assistance in problems of metric and morphological techniques and for criticizing the manuscript. For the use of metric material on the skeletal series from the Chiggerville site, Kentucky, which at the time of writing was unpublished, we are grateful to Professor Webb and to Mr. Ivar Skarland. For other comparative material we have drawn on an index file of American Indian skeletal material which is being built up by us in cooperation with Dr. Kluckhohn and Mr. Skarland. Finally, we wish to thank Mrs. Marshall T. Newman for her great assistance in preparing the manuscript and in reading proof.

The final report upon all the skeletal material from Pickwick, Wheeler, and Guntersville Basins is now being written. It is hoped that it will be published shortly.

AVAILABLE SKELETAL DATA

The archeologically documented cranial and postcranial data available for this report are divided into the following series:

1. Five male skeletons from underneath site Ct° 27.
2. Male and female Shell Mound[2] skeletons from sites Lu° 25, Lu° 67, Ct° 27, and Lu° 61.
3. Male and female skeletal series from an intrusive "Koger's Island"[3] cemetery in the Shell Mound, site Lu° 25.
4. Male and female skeletal series from the Koger's Island cemetery, site Lu^{v} 92.
5. A few male and female skeletons which cannot be placed with any real certainty with either Shell Mound or "Koger's Island" groups.

PROBLEMS

These data lead us to formulate the following problems:

1. What is the probable relationship of the Ct° 27 submound skeletons to the Shell Mound skeletal series?
2. What are the relationships of the Shell Mound series to each other? Do they appear to represent a reasonably homogeneous population, or are diverse subracial elements present? In any case, what are the affinities of the Shell Mound series outside of Pickwick Basin?
3. What is the relationship between the Lu° 25 "Koger's Island" series and the series from the Koger's Island cemetery itself (Lu^{V} 92)? Do they represent a fairly homogeneous population? Are they distinct from the Shell Mound series? What are their affinities outside of Pickwick Basin?
4. What are the probable relationships of the few "unplaced" skeletons?

There are several other problems which need attention, such as the relationship between physical type and form of burial, the possible change in physical characters from the deepest Shell Mound burials to the most superficial, and the relation of artificial deformation to physical type.

COMPARATIVE SKELETAL DATA

The scope of the comparative portions of the report has been limited to the eastern United States, bounded roughly by the Mississippi River on the west and the Great Lakes on the north, with the exception of series from other areas used in the comparisons of standard deviations. In a preliminary report such as this we have not attempted to deal with all the racial problems of this area, but rather have sought the skeletal series within the region to which the Pickwick Basin series show the closest affinities. In other words, we have contented ourselves with attempting to place our series in their proper subracial contexts.

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[2] Henceforth we will use the term "Shell Mound" to differentiate the physical type of the builders of the shell mounds from the intrusive "Koger's Island" physical type found in the tops of the shell mounds and in a separate cemetery.

[3] We use the term "Koger's Island" in quotes to differentiate this intrusive cemetery of Koger's Island culture from the Koger's Island cemetery itself (Lu^{v} 92). In such cases the former is designated as Lu° 25 "Koger's Island." In referring to the pooled series from both these sites, "Koger's Island" by itself is used.

We have further endeavored to take full cognizance of the archeological data provided us by Professor Webb and others, and have essayed to make our researches act as an adjunct to archeology.

METHODS OF ANALYSIS

The interpretation of the skeletal data has not been performed without certain hazards. In the first place, a large portion of the skeletal material, particularly from the shell mounds, was fragmentary. This necessitated large-scale processing and restoration, which was done by a picked crew of workers selected from the WPA rolls. As far as we are aware, skeletal restoration of this scale could not be performed in the allotted time without the aid of some Government agency. We hasten to assert that we have a good deal of confidence in the measurements and observations taken on the restored skeletal material used in this report.

In the second place, a number of measurements and indices in the series at our disposal are represented by insufficient numbers. In the face of inadequate samples one must always resort to qualifications which, while they may appear to clog up a report by rendering it more verbose, are extremely necessary safeguards. Of course, one can make completely unqualified statements concerning any series, however small, as long as there is no attendant assumption that the series in question is a statistically adequate sample of the population from which it is drawn. But in drawing pertinent conclusions from skeletal data one is always confronted with this sampling problem. There are some indications in the work of Poniatowsky (1911) as to what size series constitute statistically adequate samples in respect to certain cranial indices. Further, the size of the probable errors of the means affords some indication of the statistical adequacy of a sample; i. e., if the probable errors are very small we have, then, a reasonable certainty that the particular sample is "typical" of the race or type. Much beyond this one is forced to guess at the statistical adequacy of human samples.

In the third place, there is the corollary problem involving the matter of interseries differences. The question is always as follows: Is this difference or that difference between two series large enough to be considered statistically significant? To answer this question one can calculate the × P. E.'s of the differences between the means of two series, and arrive at a perhaps overly concrete measure of the significance or lack of significance of the differences. We have not adopted this type of analysis for assessing the differences between means or between standard deviations, partly because the series are mostly small and partly because of lack of time. We have, however, included the statistical constants necessary for such a procedure for those who see fit to use them on small series. Our alternative has been to check the differences between the means of male series against those of the corresponding female series. If the differences between the two sets of means run in the same direction, it is more likely that they are not due to sampling errors. Such differences, however, may not be large enough to be considered statistically significant. In deciding whether or not they are, we have in each case made a subjective judgment, such as "possibly significant," "probably significant," and the like.

In the fourth place, we have used standard deviations [4] to indicate the order of variability in our various series, but in a number of measurements and indices the numbers represented are quite small. Although no standard deviations were calculated for the measurements and indices represented by less than 20 individuals, it is to be strongly suspected that some of them do not give proper estimates of the variabilities of the populations from which they are drawn.[5] In a preliminary report such as this we have not been able to deal with the coefficients of variation. With larger series at our disposal it would be advisable to employ them in respect to matters of variability.

Metric and Morphological Techniques

The measurements taken follow the blanks made up at the Peabody Museum of Harvard University (codes A to E), with a few additions.[6] The following are the cranial measurements we employed, with summary definitions of each. The numbers and letters referring to these measurements as defined by Martin (1928, pp. 611–669) and Morant (1923, pp. 196–198), respectively, are given in each case.

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[4] It is to be remembered that the standard deviation is, if anything, more susceptible to errors of sampling than the mean itself. (Verbal statement by Prof. Karl Pearson, quoted in lecture material by Prof. L. H. D. Buxton.)

[5] Morant (1928, p. 306) states, "If the number of skulls in the series be small—less than 100, say—then the standard deviations of the characters cannot be found with sufficient approach to the true values . . . ." We venture that other authorities might lower the requisite number to about 40.

[6] In these additional measurements we have followed the lead of G. K. Neumann, and have also drawn heavily upon his outline of definitions for measurements.

TABLE 1.—*Definitions of craniometric measurements*[1]

Peabody Museum code	Measurement	Definition	Martin	Morant
a	Glabello-occipital length	g-op	1	L
b	Maximum breadth	eu-eu	8	B
c	Basion-bregma height	ba-b	17	H′
d	Mean thickness left parietal			
e	Minimum frontal diameter	ft-ft	9	B′
c′	Auricular height	po-po to apex—F. H.*	21	
	Frontal chord	n-b		OH
	Frontal angle	n-b—F. H.**	72	
	Horizontal circumference	g-op	23	U
	Nasion-opisthion arc	n-o	25	S
	Transverse arc	po-b-po	24	Q′
	Total facial angle	n-pr—F. H.**	73	
	Midfacial angle	n-ns—F. H.**	74	
	Alveolar angle	ns-pr—F. H.**		
f	Bizygomatic diameter	zy-zy	45	J
	Zygomaxillare-zygomaxillare breadth	zm-zm	46	
g	Total facial height	n-gn	47	GH
h	Upper facial height	n-alv. pt	48	G′H
	Basion-nasion length	n-ba	5	LB
	Basion-prosthion length	pr-ba	40	GL
k	Nasal height	n-ns	55	
l	Nasal breadth		54	NB
m	Orbital height (left)		521	O_2^L
	Orbital breadth (left)	mf-ec	511	G_1^L
n′	Orbital breadth (left)	d-ec	51a	IOW
	Simotic subtense****			SS
	Least nasalia breadth		57	SC
	Internal orbital width	fmo-fmo		IOW
	Subtense to internal orbital**** width	fmo-fmo—n		SIOW
r	Interorbital breadth	d-d	49a	DC
	Dacryal subtense****	d-d—nasal bridge		DS
s	Biorbital breadth	ec-ec	44	
t	External palatal length	pr-alv	60	
u	External palatal breadth	ecm-ecm	61	
v	Condylo-symphyseal length	pg-cdp***	68.1	
w	Bicondylar breadth	cdl-cdl		W_1
x	Symphysis height	gn-dt		h^1
y	Bigonal breadth	go-go	66	W_2
	Minimum breadth of ascending ramus		71a	
	Mandibular angle (left)	***	79	

[1] Asterisks indicate instruments used, as follows: *, Ranke craniophore used; **, Ansteck goniometer used; ***, gonio-osteometric board used; ****, coordinate caliper used.

The cranial observations were taken according to the Peabody Museum blanks, using that somewhat elusive being, the average northwest European male of middle age, as a standard. Observations on suture closure were taken endocranially with a small pocket flashlight, and were assessed according to unpublished White standards set up by the late Prof. T. Wingate Todd, of Western Reserve University.[7]

The postcranial measurements are self-explanatory, except for the maximum tibial length, which excludes the tibial spine. The postcranial observations were made with reference to the same White standard.

Assessment of sex was performed on both the skull and postcranial skeleton in each case, with the sexing of the postcranial skeletons and some of the skulls falling on Snow.

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[7] A number of females were assessed as subadult (18–20 years), whereas males with a corresponding status of suture closure, tooth eruption, and epiphyseal union were classed as young adults (21–35 years). The reason for this is that the growth processes of females appear to be 2 years or so in advance of males. No females were used in the series that did not show complete closure of the basilar suture and eruption of the third molars.

SEPARATE SHELL MOUND SERIES

VARIABILITY OF THE LU° 25 SERIES

A discussion of the variability of the Shell Mound samples is pertinent prior to the analysis of interseries differences. If these series show low variabilities in their measurements and indices, it would seem more likely that the means for these measures are fairly representative of the parent populations. It would be much more satisfactory if we had statistical measures of variability for all the Shell Mound series, but we must content ourselves with a provisional analysis of the variability of the Lu° 25 series.

In this analysis we have compared standard deviations for all measurements and indices represented by 20 or more crania with von Bonin and Morant's (1938, p. 124) average standard deviations for 14 American Indian male series, and with standard deviations for a male series of Basket Makers from Grand Gulch, Utah.

As to the variability of the 14 American Indian series, von Bonin and Morant (1938, p. 126) state: "The average standard deviations for the . . . series are found to be remarkably close to those of a long series of late dynastic Egyptian crania, and this order of variability is rather less than that found for modern series of crania from western Europe." These averages are, nevertheless, not those one would expect for really homogeneous populations. The composite nature of American Indians in general must be kept in mind in the following analysis.

The Grand Gulch Basket Maker series from Utah is doubly convenient for comparative purposes, since it is from all indications quite homogeneous, and since its numbers are nearly the same as those of our Lu° 25 series.

TABLE 2.—*Comparison of standard deviations for Lu° 25 series with the total U. S. A. Indian and Utah Basket Maker series*

Measurements (mm.) and indices	Lu° 25 males	Average for 14 U. S. A. male series	Utah Basket Maker males	Lu° 25 females
Glabello-occipital length	4.72±0.36 (39)	5.42 (1,093)	3.84±0.32 (33)	4.07±0.34 (32)
Maximum breadth	5.25± .40 (39)	4.80 (1,084)	4.77± .40 (33)	3.81± .31 (34)
Basion-bregma height	2.83± .30 (20)	4.68 (943)	3.58± .31 (30)	
Upper facial height	3.70± .35 (26)	3.94 (839)	4.29± .36 (33)	
Nasal height	2.77± .25 (28)	2.83 (932)	2.50± .19 (41)	
Nasal breadth	1.91± .18 (25)	1.79 (928)	1.20± .09 (40)	
Length-breadth index	2.95± .23 (37)	3.12 (1,073)	3.28± .27 (33)	2.71± .24 (30)
Nasal index	3.56± .35 (23)	4.15 (919)	2.95± .22 (40)	
Minimum frontal diameter	5.07± .39 (39)			3.07± .27 (30)
Horizontal circumference	10.77± .98 (33)			7.64± .73 (25)
Length-height index	2.09± .22 (20)			
Breadth-height index	4.08± .44 (20)			
Fronto-parietal index	3.24± .25 (37)			2.31± .20 (31)

From a perusal of this patently incomplete list of standard deviations, it is apparent that in only two measurements out of eight measurements and indices the Lu° 25 male series is higher than the U. S. A. series averages. These measurements are maximum breadth and nasal breadth (excesses of 0.45 and 0.12, respectively). In the case of basion-bregma height,[8] and to a lesser extent glabello-occipital length and nasal index, the Lu° 25 male figures are lower than the U. S. A. averages (differences of 1.85, 0.70, and 0.59, respectively). Probably these are the only significantly different figures. All that can be said is that the variability of the Lu° 25 males as measured by the standard deviation seems a little lower, if anything, than that of the total U. S. A. series.

In comparing standard deviations for the Lu° 25 males with those for the Basket Maker males, we find that in five out of eight measurements and indices the Basket Maker figures are lower, but the differences are probably only significant in the case of glabello-occipital length and nasal index (differences of 0.88 and 0.61, respectively). Even here we must remember we are dealing with short series and the figures may not be representative. Again in the case of basion-bregma height, and in upper facial height and length-breadth index, the Lu° 25 figures are lower (differences of 0.75, 0.59, and 0.33, respectively). Provisionally stated, it would appear that the Basket Maker series is rather the less variable of the two.

In the five measures at our disposal it would appear that the Lu° 25 males were more variable than females from the same site. There are less definite indications of reduced variability in females of the total Shell Mound and Lu^v 92 series, as compared with the corresponding males. This would appear to be in accord with Woodbury's[9] assertion that female crania are less affected by age changes and less skewed by sexual factors of growth than male crania, and hence provide more satisfactory data for racial analysis.

ANALYSIS OF A PUTATIVE CHANGE IN THE LU° 25 POPULATION, WITH SPECULATIONS AS TO ITS SIGNIFICANCE

To return to our figures for the Lu° 25 males, it is apparent that a standard deviation of 5.07 for minimum frontal diameter is suspiciously high. Checking the reason for this by means of a distribution curve, we found fair evidence of bimodality, with a narrow peak at 89 mm. (6 crania) and a lower peak of greater spread at 93–95 mm. (10 crania). Another distribution curve was drawn up for maximum breadth because it also showed an overly high standard deviation. This curve as well evidenced fairly definite bimodality: there was a widespread minor mode from 127–131 mm. (10 crania) and a narrower major mode from 133–136 mm. (16 crania). In checking through individual measurements, 8 out of 13 crania that had minimum frontal diameters of 90 mm. and below had maximum breadths of 131 mm. and lower. The numbers represented are quite small, but the degree of correlation is fairly high. Of course, the two diameters are not likely to vary independently of one another. In table 3, however, it is apparent that the mean minimum frontal diameters of the upper and lower series are practically the same, while the mean maximum breadths show rather substantial differences. There do not appear to be any other correlations of this nature in the data at hand. We shall return to the suggestion of mixture offered in the bimodality of these distribution curves later.

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[8] The standard deviation of 2.83 for basion-bregma height in Lu° 25 males is so low that it arouses suspicion. Probably the numerical insufficiency is responsible, since the distribution curve for the measurement shows that one-half of the individual measurements make up a peak at 142 and 143 mm. Possibly more measurements would flatten out the curve and increase the standard deviation.

[9] Personal statement.

We can sum up the findings on variability up to this point: the Lu° 25 series does not appear to be as homogeneous as one might possibly expect. The archeological evidence for the site suggests that we are dealing with a rather small and perhaps isolated hunting population. Assuming for the moment that our samples represent this population adequately, two explanations—which may operate together—for this unexpected degree of heterogeneity may be advanced. First, the Shell Mound population, of which the people of Lu° 25 were a part, may have been physically somewhat composite when they settled the area. Second, during some stage of their residence there, admixture with incoming groups of different physical type may have increased their variability. If this factor was operative we should expect some change of physical type from bottom to top of the mound, providing, of course, that the mound was a seat of fairly continuous residence for some time.

It is at least equally possible that the two phenomena worked hand in hand, but in order to test out this latter hypothesis with such meager data as we have on hand, we split the Lu° 25 cranial series into two groups on the basis of depth in the mound. It so happened that there was only one burial between 3 and 4 feet of depth,so all those crania below 4 feet were placed in one group and those above 3 feet in another, the lone skull in between placed arbitrarily in the upper group.[10] This procedure provides us with lower-zone male and female series of 30 and 28 crania respectively, and corresponding upper-zone series of 10 and 6. A number of these are fragmentary crania upon which only a few measurements could be taken. To compensate partly for the small size of the series we used those parenthesized measurements which are "close approximations." These "approximations" are otherwise not used in this report.

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[10] Of course, a much more satisfactory way to deal with this problem would be to use some statistical device to measure the degree of individual relationship between skeletal characters and burial depths.

Since this arbitrary split was made between the 3- and 4-foot levels, we have been informed by Miss Dunlevy that the line between the pottery and prepottery zones is at 3 feet. This will make comparison of the upper and lower series doubly interesting since a change of physical type with advent of pottery would be quite significant.

The only available measurements and indices which provide even large enough numbers to attempt a comparison of the lower and upper series are glabello-occipital length, maximum breadth, minimum frontal diameter and length-breadth index. The following are the means of the split series:

TABLE 3.—*Comparison of means of the lower and upper series*

MALES

Measurements (mm.) and indices	Lower series			Upper series		
	No.	Range	Mean	No.	Range	Mean
Glabello-occipital length	29	180–190	184.51	10	173–191	183.60
Maximum breadth	30	126–141	131.73	10	130–143	136.50
Minimum frontal diameter	29	84–102	91.31	8	83–95	91.00
Length-breadth index	29	65.96–77.90	71.43	10	70.16–80.79	74.49
FEMALES						
Glabello-occipital length	28	(193) 169–182	178.18	6	168–177	172.67
Maximum breadth	28	120–140	131.11	6	132–135	133.00
Minimum frontal diameter	24	85–93	89.54	6	84–96	90.33
Length-breadth index	27	(68.39) 70.00–79.65	73.33	6	75.14–78.57	76.95

The differences between the means in glabello-occipital length are insignificant in the male series; greater in the female series; but both differences are in the same direction. So while there may be a reduction of vault length in the upper-zone population as contrasted to the lower-zone, our figures do not show it well enough to allow us to commit ourselves.

The increase in maximum breadth shown by the males and female means of the upper series is quite striking. Despite the small size of the series, the differences are perhaps great enough to be of some significance. This difference, of course, makes for dissimilarities in the length-breadth indices of the two series. The upper-zone mean for males is three index units higher than the corresponding figure for the lower-zone. The female series shows a difference in the same direction of over three units. All means, except that of the upper-zone females, fall within the limits of dolichocrany.

There are no perceptible differences in the means for minimum frontal diameter between the series in question. The individual figures for low minimum frontal diameters are scattered through both lower- and upper-zone series, although the individual crania with low minimum frontal diameters and accompanyingly low maximum breadths are confined to the lower series. These, then, are the main metric differences we can amass.

Another way we can attempt to decide which of the two factors (viz., original relative heterogeneity or later admixture) are most operative in the Lu° 25 series is by again resorting to standard deviations. These have been calculated for those measurements numbering 20 or over.

TABLE 4.—*Standard deviations of total Lu° 25 series and the lower-zone male series*

Measurements (mm.) and indices	Total	Lower zone
Glabello-occipital length	(39) 4.72±0.36	(28) 4.13±0.37
Maximum breadth	(39) 5.25± .40	(27) 5.08± .47
Nasal breadth	(25) 1.91± .18	(20) 1.58± .17
Length-breadth index	(37) 2.95± .23	(26) 3.22± .30
Minimum frontal diameter	(39) 5.07± .39	(29) 4.87± .43

In the linear measurements the lower series shows somewhat lower standard deviations than does the total series. We doubt seriously if the differences are large enough to be significant, but it should be kept in mind that the smaller size of the lower series should, if it is equally as variable as the total series, raise its standard deviations. The fact that the lower series shows lower standard deviations for the above measurements is more significant than the actual figures indicate. The higher standard deviation in length-breadth index for the lower series is indeed puzzling. The only explanation we can offer is that the smaller series' size raised the standard deviation. Other than this we can proffer no reason for the higher figure.

So if we have sufficient evidence to make any statements at all, we can only say that while there are suggestions of a change in physical type in the Lu° 25 series, there is no unequivocal evidence of increasing heterogeneity in the upper zone of the mound.

Lacking any really definite statistical validation of possible evidence of admixture in the upper zone, we must, nevertheless, proceed with an analysis of the differences between the means of the split series.

What the differences in maximum breadth and length-breadth index indicate is perhaps to be considered suggestive of admixture with brachycranic people toward the end of the existence of the Shell Mound people in the area. From what we know of the physical anthropology of the Southeast, it seems a reasonable guess that in at least part of this area an earlier dolichocranic population was later displaced, probably after considerable admixture, by a brachycranic people.[11] These brachycranic people may be represented in a more unmixed form in the intrusive "Koger's Island" cemetery at Lu° 25, the single intrusive burials in other shell mounds, and the separate cemetery at Koger's Island itself. What we are presenting, then, is stratigraphic evidence confirming Hrdlička's statements. Fuller discussion of this evidence is relegated to a later section. The putative change of physical type in the upper zone of Lu° 25, however, must not be considered more than a suggestion. Nevertheless, we must say that even as a suggestion, it fits very well indeed with Hrdlička's evidence.

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[11] Hrdlička (1922, p. 113) has indicated just what we are suggesting, namely that the older population of the Southeast was dolichocranic and later mixed with incoming brachycranic peoples.

However, we must not throw caution to the winds. If such differences as those in head breadth and length index were duplicated in other measurements and indices, and further, if upon more thorough investigation of larger series there appeared to be a morphological differentiation between lower and upper series, we could state our findings in no uncertain terms. As it is, insufficiency of data compels us to state our case as follows: In the shell mounds (at least in site Lu° 25) there may be a change of physical type consistent with the later influx of brachycranic peoples into the region, but we cannot satisfactorily demonstrate such a change with the data on hand.

COMPARISON OF PICKWICK BASIN AND KENTUCKY SHELL MOUND SERIES

A comparison of the two Pickwick Basin Shell Mound series (Lu° 25 and Lu° 67) led to quite inconclusive results which we have not included here. In order, then, to establish the physical position of these series we have drawn upon two skeletal series from culturally similar sites outside of the Basin. These sites are in Ohio County, Ky., within 5 miles of each other (Webb and Funkhouser, 1932, pp. 324–327), and fit into the general "shell mound" cultural complex represented in the Pickwick Basin mounds.[12] The first is the famous Indian Knoll site excavated and reported by C. B. Moore (1916, pp. 341–487). The crania from this site have been described by Hrdlička (1927, pp. 26–29). The second is the Chiggerville site reported on by Webb and Haag (1939), with the skeletal material described by Skarland in the same publication.

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[12] Information from Prof. W. S. Webb.

TABLE 5.—*Cranial measurements and indices of the Pickwick Basin and Kentucky Shell Mound series* [1]

Measurements (mm.) and indices	Males				Females			
	Luº 25	Luº 67	Chig-ger-ville	Indian Knoll	Luº 25	Luº 67	Chig-ger-ville	Indian Knoll
Glabello-occipital length	(39) 185.3	(12) 178.8	(24) 181.1	(34) 177.0	(32) 176.7	(10) 175.1	(13) 172.5	(26) 170.3
Maximum breadth	(39) 133.7	(12) 136.0	(24) 134.2	(34) 135.8	(34) 131.1	(10) 130.4	(12) 130.8	(26) 131.2
Basion-bregma height	(20) 141.6	(5) 138.4	(4) 139.5	(27) 139.5	(12) 136.8	(6) 133.0	(6) 132.0	(25) 131.1
Auricular height	(7) 120.6	(11) 120.6	(21) 121.1	--------	(2) 114.5	(8) 114.8	(13) 114.9	--------
Cranial module	(20) 153.6	(4) 151.8	(5) 151.4	151.0	(8) 148.4	(6) 146.0	(6) 145.3	(25) 144.1
Minimum frontal diameter	(39) 93.4	(12) 92.9	(19) 92.4	--------	(30) 89.7	(11) 89.1	(13) 88.5	--------
Horizontal circumference	(33) 508.0	(10) 501.5	(18) 503.5	--------	(25) 492.5	(9) 489.0	(12) 485.1	--------
Nasion-opisthion arc	(5) 380.8	(6) 368.7	(11) 370.7	--------	(1) 365.0	(9) 358.8	(9) 349.4	--------
Transverse arc	(8) 316.2	(10) 311.8	(24) 307.5	--------	(2) 302.0	(9) 297.3	(9) 296.7	--------
Nasion-basion length	(20) 103.0	(5) 102.2	(4) 107.0	--------	(11) 100.6	(6) 97.7	(7) 97.1	--------
Basion-prosthion length	(14) 97.4	(1) 95.0	(4) 102.0	--------	(6) 97.7	(3) 95.0	(5) 95.2	--------
Length-breadth index	(37) 72.8	(10) 76.1	(23) 74.3	(34) 76.7	(30) 74.4	(10) 74.6	(12) 75.4	(26) 77.0
Length-height index	(20) 77.1	(4) 78.0	(4) 78.1	(27) 78.8	(9) 77.5	(5) 76.2	(6) 76.3	--------
Length-auricular height index	(7) 65.0	(9) 67.2	(24) 66.8	--------	(2) 64.7	(8) 65.8	(12) 66.6	--------
Breadth-height index	(20) 105.0	(5) 101.8	(4) 104.3	(27) 97.3	(11) 104.1	(5) 101.3	(6) 101.3	--------
Fronto-parietal index	(37) 69.7	(10) 68.6	(17) 68.4	--------	(31) 68.4	(10) 68.3	(10) 68.1	--------
Total facial height	(5) 119.6	(5) 120.6	(8) *110.3	(24) 115.7	(1) 117.0	(6) 109.8	(6) *107.5	(20) 104.9
Upper facial height	(26) 71.2	(4) 71.2	(9) 69.1	(25) 70.4	(18) 66.5	(3) 63.3	(6) 66.3	(20) 63.6
Bizygomatic diameter	(14) 138.1	(6) 137.3	(3) 137.7	(21) 136.0	(10) 126.8	(4) 131.8	(2) 126.0	(15) 124.5
Nasal height	(28) 51.5	(8) 51.1	(13) 50.3	(29) 50.9	(19) 48.2	(7) 45.5	(6) 47.8	(22) 46.0
Nasal breadth	(25) 25.7	(6) 26.0	(9) 25.8	(26) 23.8	(12) 24.1	(8) 24.4	(5) 24.8	(22) 22.6
Orbital height	(7) **36.2	(7) **34.7	(8) **32.4	(27) 32.6	(1) **36.0	(7) **33.5	(6) **33.3	(25) 32.5
Orbital breadth (dacryal)	(3) **42.6	(2) **39.5	(7) **38.6	(27) 38.1	--------	(6) **39.0	(8) **37.5	(25) 36.5
External palatal length	(4) 51.2	(5) $ 53.8	(11) 52.6	--------	(1) 53.0	(5) 50.6	(5) 50.8	--------
External palatal breadth	(2) 63.0	(5) 63.6	(6) 62.2	--------	(1) 62.0	(7) 60.6	(5) 61.2	--------
Condylo-symphyseal length	(7) 98.3	(9) 98.7	(8) 99.7	--------	(2) 99.5	(8) 98.2	(6) 95.8	--------
Bicondylar breadth	(5) 129.4	(6) 124.3	(6) 122.5	--------	(1) 122.0	(6) 114.7	(7) 115.0	--------
Bigonial breadth	(7) 106.0	(8) 102.0	(14) 101.6	--------	(2) 97.0	(9) 94.4	(10) 94.3	--------
Symphysis height	(3) 36.8	(4) 33.4	(12) 33.7	--------	(1) 30.0	(9) 32.0	(5) 30.8	--------
Minimum breadth of ascending ramus	(7) 34.0	(11) 33.9	(19) 33.7	--------	(2) 30.1	(7) 33.4	(10) 31.4	--------
Mandibular angle	(7) 117.1°	(10) 116.5°	(13) 116.2°	--------	(2) 126.0°	(7) 117.1°	(10) 122.2°	--------
Total facial index	(3) 87.0	(3) 85.9	(3) *80.2	(19) 84.7	(1) 91.4	(3) 84.1	(1) *87.8	(12) 84.6
Upper facial index	(8) 50.8	(1) 52.5	(3) 51.6	(18) 51.7	(8) 52.9	(1) 51.2	(1) 52.7	(12) 51.9
Nasal index	(23) 50.4	(6) 50.5	(9) 50.4	(26) 46.8	(13) 50.0	(7) 53.4	(5) 52.2	(22) 49.4
Orbital index	(3) 88.4	(2) 83.6	(5) 82.6	(27) 84.9	--------	(6) 86.6	(4) 86.4	(25) 89.0
External palatal index	(2) 129.2	(4) 119.0	(6) 119.9	--------	(1) 117.0	(4) 122.3	(4) 120.0	--------
Cranio-facial index	(13) 102.6	(6) 101.9	--------	--------	(12) 96.6	(4) 100.8	--------	--------
Fronto-gonial index	(7) 112.1	(8) 110.6	(9) 109.5	--------	(2) 110.7	(8) 105.4	(9) 105.2	--------
Mandibular index	(6) 77.1	(6) 78.5	(5) 81.0	--------	(1) 79.1	(5) 84.3	(4) 81.8	--------

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[1] One asterisk * indicates no allowance made for tooth wear; two asterisks ** indicate measurements taken on left orbits.

Because of the rather unique cultural position of these sites, a comparison and analysis of their skeletal material is pertinent.

CRANIAL DATA

VAULT MEASUREMENTS

Summarizing the results according to the sequence of the table we find that:

There appear to be considerable differences in glabello-occipital length. The Lu° 25 male crania seem significantly longer than the other male series, and are most closely approached in length by the Chiggerville males. The Indian Knoll males and females show the lowest means while Lu° 67 and Chiggerville are intermediate in both male and female series. Certainly there is a wide difference between Lu° 25 and Indian Knoll in respect to both sexes, and considering the numbers at our command, the differences cannot fail to be significant.

In maximum breadth the Lu° 67 and Indian Knoll males are practically identical, with the Chiggerville males lower and the Lu° 25 males the lowest. The significant differences are perhaps only to be found in the extremes. All the female means are very similar.

In basion-bregma height the two Lu° 25 series exceed the corresponding Indian Knoll series by only a small amount in males and by considerably more in females. The meagerly represented means for the Lu° 67 and Chiggerville males and females are closer to those for Indian Knoll.

The means for auricular height are practically identical in the three male and in the three female series. Indian Knoll is unrepresented in this measurement.

The cranial module shows a size regression for both sexes running in the following order: Lu° 25, Lu° 67, Chiggerville, and Indian Knoll. Probably only the extremes are to be considered significantly different.

In minimum frontal diameter there is a regression in both male and female series from slightly higher means for Lu° 25 through the intermediate Lu° 67 series to Chiggerville which has the lowest means. There is a size trend here, but the differences by themselves are probably not significant.

In the three vault circumferences Lu° 25 males and females show the highest means, but the remaining vault measurements show no noteworthy differences.

VAULT INDICES

In length-breadth index the Lu° 67 males show a mesocranial mean only slightly lower than that of the Indian Knoll males. The Chiggerville males are intermediate and the Lu° 25 males have the lowest mean. The female means for Lu° 25, Lu° 67 and Chiggerville are quite similar and cluster around the dolicho-mesocranic border line. The Indian Knoll females are in a class by themselves with a mean index of 77.

In the length-height indices the differences between male and female series are slight. All means fall within the lower limits of hypsicrany, the males showing slightly higher figures. The length-auricular height index means are equally similar, and all fall in the hypsicranial category. Data for this index are not available for the Indian Knoll series.

In breadth-height index the Lu° 25 males show a considerably higher mean than do the Indian Knoll males. This difference is due to the lower maximum breadth for Lu° 25, with basion-bregma height remaining about the same in both series. The male means for Lu° 67 and Chiggerville are intermediate, with the latter the higher of the two. The female mean for Lu° 25 is about three index units higher than those for Lu° 67 and Chiggerville, but again numbers are small. The mean for the Indian Knoll males is barely within the upper limits of metriocrany, while the other series are acrocranic.

For fronto-parietal index, the means of all the series are practically identical and fall around the metrio-eurymetopic border line. No data are available for the Indian Knoll series.

FACIAL MEASUREMENTS

The total facial height is meagerly represented from point of numbers, but there are some indications that the Pickwick series are longer faced. This is in part borne out by the male means for upper facial height, but the differences are doubtless not really significant. In the females, Lu° 25 has a perhaps significantly higher mean than Indian Knoll.

In bizygomatic diameter the two Lu° 25 series top the Indian Knoll series by a fair margin. The other series show means exceeding the Indian Knoll figures, but the numbers are too small to permit comparison.

In nasal diameters Lu° 25 exceeds Indian Knoll, but the differences are only really striking in nasal breadths. Indian Knoll is distinguished from all the other series by much narrower nasal apertures. Other than these there are only very slight interseries differences.

The orbital data are scanty but, if anything, might indicate a diminution of the dimensions of Lu° 67 and Chiggerville as against Lu° 25, and an even further size reduction in Indian Knoll.

The palatal measures are so poorly represented that it is impossible to learn anything from them.

The mandibular measurements are not particularly illuminating, although the means for bigonial breadth suggest a size regression from Lu° 25 through Lu° 67 to Chiggerville. There are other regressions in the male series, unsubstantiated, however, by female data.

FACIAL INDICES

Lacking sufficient data for the total facial index we proceed to the better represented upper facial index. Here there appear to be only small differences; all fall in the lower half of the mesene division.

In nasal indices the only striking feature is the low mean for the Indian Knoll males which is on the upper border of leptorrhinic category. The rest of the males and the Lu° 25 females fall in the high mesorrhine division, while the Lu° 67 and Chiggerville females are platyrrhine.

The orbital index is poorly represented in all but the Indian Knoll series where the male mean falls in the lower part of the mesoconch category and the female mean on the border between meso- and hypsiconch. Except for the Chiggerville males who are barely chamaeconch, the other series have mesoconch means.

All the means for the external palatal index are high and although there are minor differences in relative breadth, all fall in the brachyuranic division.

The available male series show about the same forehead to mandible proportions in their means for the fronto-gonial index. Excepting the Lu° 25 female mean (represented by only two individuals) the female series show identical means.

Both in the cranio-facial and the mandibular indices the series show considerable variation which may be attributable to series size.

SUMMARY

In a number of vault dimensions there is a size regression running from the larger Lu° 25 crania through the intermediate Lu° 67 and Chiggerville groups to the smaller Indian Knoll crania. Differences in vault proportions are evidenced by the higher length-breadth indices and lower breadth-height indices of the Indian Knoll as compared to the Lu° 25 series, with the other series again intermediate.

In facial diameters the Lu° 25 series exceed those from Indian Knoll, in some cases by substantial margins. The Lu° 67 and Chiggerville series usually are intermediate in size. Indicial differences in the facial skeleton are small.

The Indian Knoll series differ from the other series, particularly in smaller nasal breadths. This difference leads to lower and more leptorrhine nasal indices for the Indian Knoll series. The orbital and some of the mandibular dimensions indicate a size reduction[13] for the Indian Knoll group.

In respect to size reduction, the Lu° 67 and Chiggerville series are intermediate in many cases between the Lu° 25 and Indian Knoll series. Perhaps the only significant differences in size are between the latter two.

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[13] We use the term "reduction" not in the sense that the Indian Knoll and other series have become reduced in size from a larger ancestral strain, but simply that in comparison to some groups they are smaller or, if you will, reduced.

A comparison of morphological observations on the crania of Lu° 25 and Lu° 67 show the former to have somewhat heavier muscle attachments, larger brow ridges, greater glabellar prominence, greater occipital curvature, shallower glenoid fossae, greater orbital inclination, greater chin projection, less alveolar prognathism in the mandible, and heavier pterygoid attachments. Since the Lu° 67 series is represented by about 10 males and 12 females these differences are not as well founded from the point of view of sampling as they might be. Nevertheless, a number of these differences indicate greater gracility in the Lu° 67 series.

POSTCRANIAL DATA: METRIC CONSIDERATIONS

LU° 25 SERIES VERSUS LU° 67 SERIES

The reduction of vault diameters of our Lu° 67 series as compared to those of Lu° 25 is in most cases paralleled by the metric data on long bones. Except for maximum and bicondylar lengths [14] of the femur and maximum length of the ulna, the male and female series from Lu° 25 exceed those from Lu° 67 in long-bone lengths. The means for head and shaft diameters in the two Lu° 25 series exceed those for Lu° 67 in most cases. Exceptions, i. e., where the Lu° 67 means are greater than the Lu° 25 means, are the following in males and females: Left femur, antero-posterior subtrochanteric diameter, in females alone; left femur, lateral subtrochanteric diameter; right and left femur, lateral mid-shaft diameter.

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[14] If unpaired right and left femora are used, both Lu° 25 series slightly exceed those from Lu° 67, but if paired bones are used the Lu° 67 males top the Lu° 25 males by a more considerable margin. In case of such equivocal evidence, we had best consider that there are no differences between the series in respect to femoral lengths.

TABLE 6.—*Postcranial measurements and indices of the Pickwick Basin and Kentucky Shell Mound series*

Measurements (mm.) and indices	Males						Females					
	Lu° 25		Lu° 67		Chiggerville		Lu° 25		Lu° 67		Chiggerville	
	R	L	R	L	R	L	R	L	R	L	R	L
Femur:												
Maximum length	(21) 443.3	(14) 442.8	(13) 442.8	(14) 440.2	(15) 435.9	(17) 440.0	(8) 421.8	(6) 414.2	(11) 404.6	(9) 403.7	(5) 409.4	(7) 409.9
Bicondylar length	(20) 438.0	(14) 440.1	(12) 438.7	(14) 435.9	(16) 431.9	(17) 435.9	(9) 414.2	(8) 409.8	(11) 400.6	(10) 401.7	(5) 403.8	(7) 406.1
Maximum head diameter	(27) 45.1	(25) 44.5	(19) 44.5	(17) 53.6	(17) 44.3	(16) 42.9	(17) 39.9	(16) 39.8	(11) 39.6	(14) 39.6	(6) 39.2	(7) 39.3
Subtrochanteric antero-posterior diameter	(31) 26.1	(29) 25.8	(18) 24.9	(18) 26.2	(17) 23.2	(18) 23.0	(18) 22.9	(18) 23.4	(14) 22.5	(15) 23.6	(7) 20.0	(8) 19.5
Subtrochanteric lateral diameter	(31) 31.3	(29) 30.0	(22) 24.6	(21) 24.7	(17) 29.8	(18) 29.9	(19) 28.8	(18) 27.6	(14) 28.1	(15) 28.5	(7) 28.9	(7) 29.3
Mid-shaft, antero-posterior diameter	(30) 29.4	(29) 29.9	(22) 29.1	(21) 28.5	(18) 27.3	(18) 26.7	(19) 25.2	(18) 25.2	(15) 24.2	(13) 24.5	(7) 24.6	(7) 23.4
Mid-shaft, lateral diameter	(31) 25.0	(30) 25.1	(22) 24.5	(21) 24.2	(18) 23.7	(18) 22.9	(19) 23.0	(18) 23.0	(15) 24.0	(14) 23.8	(7) 22.6	(8) 22.9
Platymeric index	(30) 83.3	(28) 86.2	(18) 83.8	(19) 89.2	(17) 77.7	(18) 76.8	(18) 79.9	(17) 85.8	(14) 79.9	(14) 82.0	(7) 69.3	(8) 66.7
Mid-shaft index	(30) 85.6	(28) 83.6	(22) 88.8	(21) 87.2	(18) 85.1	(18) 85.8	(18) 92.3	(17) 93.1	(15) 96.8	(14) 96.6	(7) 92.2	(7) 97.8
Tibia:												
Maximum length	(23) 363.9	(15) 368.2	(9) 360.9	(11) 362.0	(9) 368.7	(7) 364.1	(8) 336.5	(10) 337.9	(4) 330.8	(5) 327.5	(5) 336.5	(5) 336.5
Nutrient foramen, antero-posterior diameter	(28) 37.0	(25) 36.8	(21) 34.6	(19) 34.5	(14) 34.9	(13) 34.2	(19) 30.5	(19) 30.8	(13) 30.0	(13) 30.0	(6) 29.3	(6) 28.5
Nutrient foramen, lateral diameter	(27) 23.0	(25) 22.8	(21) 22.0	(20) 22.3	(13) 20.8	(13) 21.1	(19) 20.1	(18) 20.1	(21) 17.4	(13) 18.5	(7) 18.1	(6) 18.1
Mid-shaft, antero-posterior diameter	(22) 32.6	(23) 33.0	(21) 30.6	(21) 30.7	(14) 31.1	(13) 30.7	(20) 26.6	(19) 27.2	(13) 26.4	(13) 26.5	(7) 25.2	(6) 24.8
Mid-shaft, lateral diameter	29 20.9	(25) 21.0	(21) 20.3	(21) 20.6	(14) 19.9	(13) 19.6	(18) 18.3	(17) 18.8	(13) 17.4	(13) 18.5	(7) 16.6	(6) 16.8
Platycnemic index	(24) 61.4	(22) 62.6	(21) 64.4	(19) 64.7	(13) 59.8	(12) 61.9	(16) 67.4	(15) 65.5	(13) 70.5	(14) 69.2	(6) 63.7	(6) 62.0
Mid-shaft, index	(25) 64.2	(22) 64.1	(21) 66.5	(21) 66.5	(14) 64.2	(13) 64.2	(16) 70.7	(15) 71.0	(13) 67.2	(13) 67.9	(7) 65.6	(6) 67.9
Fibula:												
Maximum length	(9) 356.1	(6) 359.5	(3) 347.7	(3) 349.0	------	------	(2) 351.5	(5) 347.5	(2) 317.5	(2) 308.5	------	------
Humerus:												
Maximum length	(20) 320.7	(18) 318.7	(10) 318.0	(9) 313.1	(12) 319.6	(11) 310.2	(6) 313.8	(13) 300.8	(4) 287.0	(7) 292.7	(6) 295.8	(4) 293.0
Maximum head diameter	(21) 45.2	(19) 44.8	(11) 43.6	(11) 44.3	(12) 43.6	(12) 42.1	(11) 40.4	(15) 40.6	(5) 38.7	(9) 38.7	(6) 38.8	(4) 38.0
Mid-shaft, minimum diameter	(29) 17.2	(26) 15.9	(18) 16.6	(20) 15.6	(12) 15.5	(12) 14.4	(19) 14.7	(18) 14.2	(13) 13.7	(13) 13.2	(7) 13.4	(6) 12.5
Mid-shaft, maximum diameter	(29) 23.8	(26) 22.0	(18) 23.0	(20) 21.8	(13) 22.1	(12) 19.4	(19) 20.7	(18) 19.9	(13) 20.1	(12) 18.9	(7) 18.3	(6) 17.5
Mid-shaft, index	------	------	(18) 72.6	(21) 74.2	(12) 70.6	(12) 74.3	------	------	(13) 67.9	(12) 70.1	(7) 73.3	(6) 71.3
Ulna:												
Maximum length	(11) 263.6	(7) 261.9	(10) 266.5	(12) 262.7	(1) 260	(6) 264.5	(2) 249.5	(6) 247.5	(8) 240.0	(6) 243.5	(3) 238.3	(6) 243.0
Radius: Maximum length	(13) 245.0	(12) 245.3	(9) 244.9	(10) 242.9	(9) 245.2	(7) 247.4	(7) 230.2	(3) 225.2	(6) 224.5	(7) 227.1	(4) 221.5	(4) 218.7
Humero-femoral index	(13) 74.0	(13) 72.9	(8) 72.8	(5) 72.2	------	------	(3) 72.5	(6) 73.8	(5) 72.8	(4) 71.2	------	------
Tibio-femoral index	(15) 83.7	(9) 82.2	(7) 80.9	(7) 82.3	------	------	(5) 82.2	(4) 84.2	(4) 81.5	(5) 81.6	------	------
Humero-radial index	(10) 76.9	(11) 78.4	(4) 77.8	(6) 76.7	------	------	(5) 76.4	(5) 73.4	(2) 75.0	(4) 75.5	------	------

With these exceptions, the male and female Lu° 25 series show larger diameters than those from Lu° 67. Of course, some of these differences are very small. But the trend appears to us inescapable: out of 144 means (rights and lefts, males, and females) the Lu° 67 means exceed the Lu° 25 means in only 11 cases. On the other hand only a few of these differences would probably be significant by themselves. Using the female as a check on the male differences, only maximum humeral length and maximum head diameter of the humerus show differences of this degree. In the males alone, the lateral subtrochanteric diameter of the femur, the antero-posterior diameter of the tibia at the level of the nutrient foramen, and the lateral mid-shaft diameter of the tibia show reasonably substantial differences.[15]

It is perhaps noteworthy that the trends follow along as smoothly as they do despite the small series in the case of some of the measurements.

Of the various shaft indices there may be differences approaching significance in the mid-shaft index of the femur and the platycnemic index of the tibia. In the case of the former, the Lu° 67 means are higher by 1.5 to 4.5 index units in right and left femora of males and females. In the latter the Lu° 67 means are greater by 1.5 to 3.7 index units. The Lu° 25 males are barely within the platycnemic category, while the other series are scattered through the mesocnemic division. The differences between male means for rights and lefts in respect to the platymeric index are greater than interseries differences, and the two male series fall in and around the upper part of the platymeric and the lower part of the eurymeric categories. Except for the left femora of the Lu° 25 series, the means for the female femora are in the platymeric category.

Unfortunately, time did not permit the inclusion of the morphological data for the recently restored Lu° 25 postcranial skeletons. Comparison in that respect, therefore, with Lu° 67 series is not possible.

Thus from what data we have, there appears to be a general reduction in long-bone diameters of the Lu° 67 samples as compared to those of Lu° 25. This reduction is perhaps most consistent in head and shaft diameters, which is indicative of lighter bone structure in the Lu° 67 series.

Lu° 25 SERIES VERSUS CHIGGERVILLE SERIES

Following along the line indicated by the cranial comparisons, the Chiggerville series appears reduced in long-bone dimensions as compared to Lu° 25. In only 9 out of 136 means (using males and females, rights and lefts) do they exceed the Lu° 25 series.

These are as follows: Femur—lateral subtrochanteric diameter, Lu° 25 males are greater, Chiggerville females are greater; tibia—maximum length, equivocal data for males, females are about equal; ulna—maximum length, Chiggerville males are greater, female data equivocal; radius—maximum length, Chiggerville males are greater, Lu° 25 females are greater. In no cases in which Chiggerville exceeds Lu° 25 are the differences great enough to be considered significant.

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[15] In all these cases the male series consist of 19 and over.

It is worth noting that in no measurement do the Chiggerville males and females exceed corresponding Lu° 25 series.

In the rest of the measurements, most femoral, tibial, and humeral diameters, the Lu° 25 series has a clear sweep of greater diameters. Of these, probably significant differences are to be found in the following: Femur—bicondylar length, antero-posterior subtrochanteric diameter; tibia—antero-posterior and lateral diameters at level of nutrient foramen; humerus—maximum diameter of the head. Less clear cases of significant difference are in: Femur and tibia—maximum length, antero-posterior and lateral mid-shaft diameters; humerus—maximum length, maximum and minimum mid-shaft diameters. We offer these putatively significant differences with the reservation that the series may be too small to be truly representative.

In summary, the Chiggerville series seems to show more decided reductions in size compared to the Lu° 25 series than did Lu° 67.

In the shaft indices available we find that the Chiggerville series have a much lower mean for the platymeric index. Most of the means for the series fall with the platymeric (x–85) category. Mid-shaft indices for males and females appear about the same. In both platycnemic and mid-shaft indices of the tibia, the Chiggerville males and females are lower, but none of the differences are great. Except for the Lu° 25 females, all means are platycnemic.

Lu° 67 Series Versus Chiggerville Series

Finally, it is perhaps of interest to compare the two sets of reduced series. The state of relative reduction in cranial size is uncertain, but, if anything, the Lu° 67 crania are slightly larger. The difference if a real one at all, is very small. In long bones this slight reduction becomes somewhat more clear. Out of 135 measurements (males and females, rights and lefts) the Chiggerville series exceeds Lu° 67 in 25.

Rather than cite these exceptions it is more expedient to mention the cases in which Lu° 67 figures for males and females exceed those of Chiggerville. These cases are: Femur—maximum diameter of head, antero-posterior and lateral subtrochanteric diameters, and lateral mid-shaft diameter; tibia—lateral mid-shaft diameter; humerus—maximum and minimum mid-shaft diameters. Of these differences those in lateral subtrochanteric and lateral mid-shaft diameters of the femur, and in antero-posterior diameter at level of nutrient foramen, and lateral mid-shaft diameter of the tibia are the only ones possibly of significance. Contrariwise, the Chiggerville males and females are considerably greater in the maximum tibial length. The rest of the measurements yield equivocal results. It should be noted that there is no evidence of reduction one way or the other in long-bone lengths.

In summary the Chiggerville series show some slight measure of reduction in shaft diameters as compared to Lu° 67.

In shaft indices the Chiggerville series are much lower in the platymeric index. The data on mid-shaft indices of the femur are equivocal. The Chiggerville males and females are also much lower in the platycnemic index. There are no real differences in the midshaft index of the tibia, but, if anything, the Lu° 67 series are a little higher.

Summary

In brief there appears to be a fairly constant grading down in size from the Lu° 25 series to the more or less intermediate Lu° 67 group to the Chiggerville series. These differences are largest and most consistent in shaft diameters and seem to indicate, as far as the series size will permit, a considerable reduction of long-bone ruggedness. If we are on the right track, the undescribed Indian Knoll long bones should be the most gracile.

We have no real evidence of such a consistent diminution in the long-bone lengths. Tibial lengths, in particular, are at least as great in the Chiggerville series as in Lu° 25. Insofar as long-bone lengths are indicative of stature, there is no really apparent stature reduction.

In shaft indices Chiggerville femora and tibiae are, respectively, much more platymeric and platycnemic than those from Pickwick Basin, but the figures are suspiciously extreme.[16] Their lowness may perhaps be attributed to small series.

Position of Lu° 25 Series Outside the Shell Mound Complex

Since the Lu° 25 crania are larger and more rugged than those from the other Shell Mound series, it is interesting to compare them with various other primarily dolichocranic series from the northeastern and east-central areas. As far as we are aware, Pickwick Basin is the southernmost locale in the eastern United States for such a frankly dolichocranic population. Even in this series, as we have already mentioned, there is some slight suggestion that the Lu° 25 group was mixing with brachycranic people in its later days.

CRANIAL COMPARISONS

The matter of series to choose for comparative purposes is perhaps an important one. Logically, single-site series should be compared with single-site series, just as pooled series should be compared with one another. If such comparisons were possible, interseries affinities would be more clear-cut and the resulting information would be more serviceable to archeologists. Unfortunately, however, in the northeast and east-central areas there are few series from one site, and

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[16] It does not appear to be a matter of technique since the writers and Mr. Skarland conferred on several occasions, and all followed the same mimeographed instruction sheets issued for class consumption by Dr. Hooton.

TABLE 7.—*Comparison of cranial measurements and indices of Lu° 25 with those of other series*

Measurements (mm.) and indices	Males				Females				
	Lu° 25	S. New England	F°85-86 Illinois	NW. N. Y. (Iroquois)	Lu° 25	S. New England	New Jersey (Delaware)	NW. N. Y. (Iroquois)	Roebuck (Iroquois)
Glabello—occipital length	(39) 185.3	(49) 182.2	(13) 182.5	(33) 188.6	(32) 176.7	175.5	(22) 175.2	(24) 178.7	(25) 178.6
Maximum breadth	(39) 133.7	(48) 134.0	(13) 137.3	(33) 137.7	(34) 131.1	132.0	(22) 131.6	(24) 132.7	(25) 138.8
Basion-bregma height	(20) 141.6	136.1	140.7	(31) 138.9	(12) 136.8	(23) 133.2	(17) 130.3	(23) 133.0	(21) 131.4
Cranial module	(20) 153.6	--------	--------	(31) 154.9	(8) 148.4	--------	(17) 145.8	(23) 148.1	--------
Minimum frontal diameter	(39) 93.4	93.2	92.8	--------	(30) 89.7	90.0	--------	--------	(27) 92.7
Horizontal circumference	(33) 508.0	(39) 511.0	--------	--------	(25) 492.5	492.5	--------	--------	--------
Nasion-opisthion arc	(5) 380.8	368.7	--------	--------	(1) 365.0	357.0	--------	--------	--------
Basion-nasion length	(20) 103.0	105.7	105.3	--------	(11) 100.6	97.6	--------	--------	(16) 102.4
Basion-prosthion length	(14) 97.4	102.3	98.9	--------	(6) 97.7	--------	--------	--------	(14) 100.3
Length-breadth index	(37) 72.8	(48) 73.6	75.4	(33) 73.0	(30) 74.4	(29) 75.4	(22) 75.1	(24) 74.3	(24) 77.9
Length-height index	(20) 77.1	(40) 73.6	77.3	(31) 73.9	(9) 77.5	(23) 75.9	--------	(21) 74.4	(21) 73.5
Breadth-height index	(20) 105.0	101.5	102.4	(32) 101.0	(11) 104.1	100.8	--------	(21) 100.5	--------
Fronto-parietal index	(37) 69.7	69.4	67.6	--------	(31) 68.4	68.2	--------	--------	--------
Total facial height	(5) 119.6	113.6	121.2	(2) 119.5	(1) 117.0	111.9	--------	(12) 112.0	--------
Upper facial height	(26) 71.2	69.2	74.0	(21) 74.8	(18) 66.5	67.3	(12) 68.2	(17) 69.6	(20) 69.5
Bizygomatic breadth	(14) 138.1	132.0	136.5	(23) 138.4	(10) 126.8	127.6	(11) 126.5	(19) 129.1	(23) 132.3
Total facial angle	(4) 86.2°	--------	84.5°	--------	--------	--------	--------	--------	--------
Nasal height	(28) 51.5	50.4	53.2	(27) 53.5	(19) 48.2	49.4	(16) 48.8	(18) 49.7	(21) 51.9
Nasal breadth	(25) 25.7	25.8	26.0	(26) 27.4	(12) 24.1	25.3	(16) 25.5	(18) 25.9	(24) 26.9
Orbital height	(7) 36.2	33.8	34.8	(25) 33.9	(1) 36.0	33.7	(16) 33.9	(18) 33.4	(16) 33.9
Orbital breadth (dacryal)	(3) 42.6	--------	--------	(23) 39.0	--------	--------	(15) 38.0	(18) 37.7	(18) 37.7
Orbital breadth (mf.)	(7) 42.7	42.5	41.8	--------	--------	41.6	--------	--------	--------
External palatal length	(4) 51.2	53.4	54.8	--------	(1) 53.0	51.8	--------	--------	--------
External palatal breadth	(2) 63.0	61.4	65.0	--------	(1) 62.0	69.6	--------	--------	--------
Bicondylar breadth	(5) 129.4	(20) 115.5	--------	--------	(1) 122.0	113.2	--------	--------	--------
Bigonial breadth	(7) 106.0	(26) 93.5	102.0	--------	(2) 97.0	98.0	--------	--------	--------
Symphysis height	(3) 36.8	(29) 34.1	--------	--------	(1) 30.0	32.5	--------	--------	--------
Minimum breadth of ascending ramus.	(7) 34.0	(30) 35.5	--------	--------	(2) 30.6	33.8	--------	--------	--------
Total facial index	(3) 87.0	(17) 85.6	88.9	--------	(1) 91.4	87.8	--------	--------	--------
Upper facial index	(8) 50.8	52.3	54.3	(18) 54.1	(8) 52.9	52.3	(9) 53.2	(15) 53.9	(17) 52.8
Nasal index	(23) 50.4	52.0	49.1	(26) 51.2	(13) 50.0	51.0	(16) 52.3	(18) 52.1	(21) 51.7
Orbital index (dacryal)	(3) 88.4	--------	--------	(25) 86.9	--------	--------	(13) 89.3	(18) 91.2	(15) 86.8
Orbital index (mf.)	(7) 84.8	81.0	82.0	--------	--------	(21) 80.5	--------	--------	--------
External palatal index	(2) 129.2	115.1	118.6	(14) 116.4	(1) 117.0	134.6	--------	(15) 114.3	(6) 123.2
Cranio-facial index	(13) 102.6	98.5	99.4	--------	(12) 96.6	97.0	--------	--------	--------
Zygo-frontal index	(14) 68.7	70.4	68.1	--------	(9) 71.4	70.3	--------	--------	--------
Zygo-gonial index	(4) 77.0	70.4	--------	--------	(1) 79.7	76.6	--------	--------	--------

these are all very small. The combination of adequate series and restricted locale is not to be found in the northeastern and east-central areas.

Of course, the variability of von Bonin and Morant's northeastern and east-central series is by no means large, but appears to exceed that of the Lu° 25 series. Further, only the most basic measurements and indices for these series have been published by Hrdlička, and if more complete metric descriptions are desired, other comparative series must be utilized. So while we will refer occasionally to these pooled series, it is more advantageous to confine our more serious comparisons to more geographically restricted series or to series with fuller metric data. We will use the pooled series of von Bonin and Morant for comparison with our pooled Pickwick Basin Shell Mound series.

For comparative series we have chosen: Neumann's small male series from two adjoining late Woodland sites (F° 85 and F° 86) in Illinois (Cole and Deuel, 1937, pp. 259–261); Knight's (1915) "Southern New England Indian" series of male and female crania from principally Rhode Island and Connecticut; Hrdlička's (1927, pp. 12–15, 22–23) male and female Iroquois series from New York State and his Delaware female series from New Jersey; and Knowles' (1937, pp. 55–61) Roebuck Iroquois series of female crania from southeastern Ontario. The series from the Turner Mound group in southwestern Ohio are too small to be included here. Hooton states (*in* Willoughby, 1922, p. 132) that, "The affinities of the Turner Group people are rather with the Eastern dolichocephals, although there is present a brachycephalic element such as is often found also among the Eastern Indians."

It is not our purpose to analyze the interrelationships of all the above series, but rather to document our contention that the Lu° 25 series fits in rather closely with so-called Algonkin and Iroquois series. At the same time there appear to be several features of our Pickwick Basin series not shared with the others.

Scanning the measurements on the top of table 7, we find no real differences until we reach basion-bregma height.[17] Here the Lu° 25 series shows the largest mean for males, and is approached only by the Illinois series. This difference, coupled with only moderate glabello-occipital length and maximum breadth of the Lu° 25 male crania, makes for considerable differences in the length-height and breadth-height indices. Here the hypsicranic length-height index of the Lu° 25 males is only equalled by the Illinois series. The Lu° 25 female series shows the same degree of distinctiveness.

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[17] There is a possibility that part of these differences are due to differences in measuring technique. Buxton and Morant (1933, p. 33) have indicated that this measurement is not unaffected by the personal equation.

Following down to the length-breadth index we see that while the Lu° 25 males show the most dolichocranic means, the corresponding females are equalled in long-headedness by the New York State Iroquois female series.

In upper facial height the Lu° 25 series have rather low means, although the southern New England males are lower still. The even higher means for this dimension among the pooled northeastern and east-central Algonkin series (table 11) show that perhaps this is a real difference between the Lu° 25 series and other eastern dolichocranic series. In the Lu° 25 male series this leads to a more mesene mean for the upper facial index. Concomitant with a shorter face, there is (excepting the southern New England males) a slightly lower nasal height in male and female Lu° 25 series. This slight diminution of the vertical facial diameters is not borne out by the higher orbital height seen in the Lu° 25 series. Since only seven crania are represented in the orbital dimensions, however, the contradiction may be due to sampling error.

This difference in orbital height makes for a mean approaching the hypsiconch category in Lu° 25 males. The other series all have lower, more mesoconch means.

The cranio-facial index is highest by three index units in the Lu° 25 males, indicating greater flare of the zygomata relative to cranial breadth. The Lu° 25 females do not show a correspondingly high mean for this index.

The other measurements and indices are either very similar throughout the series or are too meagerly represented to elicit further comment.

As a result we can point out in a general way that the Lu° 25 series are relatively higher vaulted, and perhaps relatively longer headed and shorter faced than the series used for comparison. But with these possible exceptions (no one of which seems very definitely established) they fit very well metrically into the eastern dolichocranic group.

POSTCRANIAL COMPARISONS

Measurements of the long bones for the northeastern and east-central areas are scanty indeed. Anything more than a perfunctory comparison, therefore, cannot be made with eastern dolichocranic series in this respect. We have chosen Hrdlička's (1916, pp. 52–72) Munsee group for this comparison, but have not felt it worth while at this point to include shaft diameters. Here we are primarily interested in long-bone lengths as indicative of stature (table 8).

TABLE 8.—*Postcranial measurements of the Lu° 25 and the Munsee series*

Measurements (mm.)	Males				Females			
	Lu° 25		Munsee		Lu° 25		Munsee	
	R	L	R	L	R	L	R	L
Femur:	(21)	(14)	(14)	(15)	(8)	(6)	(13)	(13)
Maximum length	443.3	442.8	458	463	421.8	414.2	426.5	426
Femur:	(20)	(14)	(14)	(15)	(9)	(8)	(13)	(13)
Bicond. length	438.0	440.1	452.6	458.2	414.2	409.8	421	419
Tibia:	(23)	(15)	(12)	(12)	(8)	(10)	(14)	(14)
Maximum length	363.9	368.2	385	388	336.5	337.9	353	352
Humerus:	(20)	(18)	(14)	(13)	(6)	(13)	(15)	(12)
Maximum length	320.7	318.7	325	326	313.8	300.8	307	302
Radius:	(13)	(12)	(11)	(9)	(7)	(3)	(10)	(12)
Maximum length	245.0	245.3	256.5	257.0	230.2	225.2	236.6	235.4
Ulna:	(11)	(7)	(8)	(9)	(2)	(6)	(11)	(11)
Maximum length	263.6	261.9	275.0	277.0	249.5	247.5	254.5	253.0

It will be noted that in all lengths the Munsee males and females exceed the corresponding Lu° 25 series by no small margin. Hrdlička (1916, p. 58) states that the femoral lengths for his series "correspond to the average stature of approximately 167 in the male and 156 cm. in the female. . . . They show the Munsee were somewhat above the medium, but not really tall in stature." Boas (1895, p. 374) gives the mean stature for 126 male Delaware as 171.5 cm., and for 43 female Delaware as 158.6 cm. Although obvious mixed-bloods were isolated from these series, there is a good possibility that undetected White admixture would raise the mean stature of the group.

We have employed Pearson's (1898, pp. 169–244) formula e for reconstruction of stature from long-bone lengths for the Lu° 25 and other series. We use it with the full knowledge that it may not be very applicable to American Indians.[18]

TABLE 9.—*Reconstruction of stature* (*Pearson's formula* e)

Series	Right femur and tibia	Left femur and tibia
	cm.	*cm.*
Lu° 25 males	165.16 (12)	166.62 (6)
Lu° 67 males	164.67 (7)	164.98 (7)
Chiggerville males	164.7 (10)	164.4 (7)
Lu° 25 females	154.53 (4)	154.50 (4)
Lu° 67 females	152.00 (4)	151.97 (4)
Chiggerville females	151.4 (3)	151.7 (4)

Obviously all the above series are much too small to permit the reconstruction means to be taken at all seriously. What they *may* indicate is that the Pickwick dolichocranic series are somewhat shorter than a good number of the eastern dolichos such as the Iroquois and

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[18] Von Bonin (1936, p. 151) doubts the applicability of Pearson's formula *e* to American Indians. Nevertheless the stature reconstruction means given by Hooton (1930, p. 178) and Knowles (1937, p. 28), who both used Pearson's *e*, appear to check well with presumably comparable data on the living.

Delaware. It must be remembered that the eastern dolichos as a whole were notable for an above average stature, so if we were to say anything at all, it would be that our Pickwick Shell Mound series were somewhat less than average in stature for American Indians.[19]

SUMMARY

What, finally, can we say about the interrelationships of the Shell Mound series? We must first refer to the matter of variability which we were only able to investigate for the Lu° 25 series. The amount of variability, as indicated by the standard deviation, is by no means startling, although it is somewhat higher than one might expect in a small population with little outside influence. We have pointed out a few, albeit shaky, suggestions of a change in population at this site which might assist in explaining the unanticipated degree of heterogeneity.

In general the variability of a population is dependent upon one or all of the following factors: 1, The degree of homogeneity of the ancestral strains; 2, the past and present size of the population (Boas, 1938, pp. 55–58); and 3, the relative degree and length of duration of isolation of the population. Thus, if a population is really homogeneous the chances are that its ancestors themselves were homogeneous, although this is not necessarily so (Boas, 1938, p. 64). If, further, the population was and is small, and if it is isolated from outside influences, the ratio of inbreeding would be high. Considerable inbreeding, particularly in a small group, decreases the actual number of ancestors in each family line and thus affords a situation in which their genes attain a state approaching panmixia. This would lower the variability of the family lines, and increase the chances that "any one family be a good representative of the whole population. In this sense populations with a low variability of family lines may be called homogeneous" (Boas, 1938, p. 64). In the case of the Lu° 25 series, one or all of the factors making for real homogeneity are not fulfilled.

Such considerations aside, we can say that while the Lu° 25 series do not attain the degree of homogeneity to be seen in such series as the Utah Basket Makers, they are, nevertheless, not really heterogeneous. The degree of variability is not great enough to shake what confidence we have in the better represented means.

While the suggestions of change of physical type in the Lu° 25 series are intriguing, they are unilluminating in regard to the position of the other samples in the prepottery Shell Mound population or populations. It is true that the upper-zone series of males from Lu° 25 shows a mean length-breadth index of about the same degree of mesocrany as the Lu° 67 male series and the Indian Knoll series, but it appears to be a different sort of mesocrany. The mesocrany of the upper-zone males is due mostly to an increased maximum breadth; that of the others in large part to a decreased glabello-occipital length. Hence, we cannot postulate any relationship on this basis.

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[19] Steggerda (1932, pp. 1–4) gives a range of series means of 155–175 cm. for the stature of living Indians in North and Central America. In North America alone, the range is from about 160 cm. to 175 cm., with the average stature probably around 167 or 168 cm.

There certainly appear to be considerable differences between the Lu° 25 and Indian Knoll series. In most of those measurements more or less adequately represented in number the Indian Knoll series seems quite reduced in size, beyond any reduction present in the Lu° 67 and Chiggerville series. From the foregoing discussion we have seen that in a good number of measurements and indices the Lu° 67 and Chiggerville series stood in intermediate positions between the Lu° 25 and Indian Knoll series. This seems to be true for most measurements and indices of the vault and possibly for facial and orbital diameters and for shaft diameters of long bones.

On the other hand this does not mean that in all such cases differences are significant, but we feel that the size reduction, if it is apparent in both male and female series, is indicative of an important trend. And as we have seen, there is some size reduction present in the shaft diameter of the long bones for Lu° 25, Lu° 67, and Chiggerville, in the order named.

Indicially, the Indian Knoll series differ from the others in their higher length-breadth indices and the males are distinguished by their lower breadth-height and nasal indices.

How should these differences be interpreted? In the first place these findings would almost certainly indicate that, while there appears to be a cultural continuity between the four Shell Mound sites, the skeletal series at our disposal do not indicate any great degree of continuity of physical type. If these series are drawn from the same population, then it is, to be sure, a rather heterogeneous population.

Second, which of our series most nearly represents the dominant physical type in the Shell Mound population(s)? Certainly from the point of view of the skeletal series of the eastern part of the country, the Indian Knoll crania appear unusual.[20] However, from what little we know of Shell Mound skeletal material, does it not appear that the Lu° 25 series and not the Indian Knoll is the aberrant group? [21]

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[20] In fact von Bonin and Morant (1938, p. 106) found that of all their series the Indian Knoll group was the only one showing no relationships (according to the Coefficient of Racial Likeness) to any other American Indian series. Their statements are worth quoting at some length: "The aberrance of the Kentucky series is particularly striking, and this is evidently due to the small size of its type. For all the absolute measurements . . . except H′ [basion-bregma height] the Kentucky series has by far the smallest mean, though all its indices differ unsignificantly from those for the series representing the Eastern Central States."

Carrying our inquiries further we asked Professor Webb if, in view of the physical affinities of the Lu° 67 site to the Kentucky shell mounds, there were not some cultural affiliations as well. His reply (March 1939), was as follows: "I agree that Lu° 67 is culturally more like Chiggerville than any other Alabama shell-mound site is like any Kentucky [shell mound] site." These data are suggestive of a physical and cultural parallel between the Lu° 67 site of northern Alabama and the Chiggerville site of west central Kentucky. We consider this a very intriguing situation which may indicate a physical as well as cultural differentiation for part of the Shell Mound complex. Such suggestions, however interesting, must not be pushed too far.

Speculations aside, the Lu° 25 series appears to differ from the other three Shell Mound series, and may be somewhat aberrant, somatically speaking, in the total Shell Mound complex. Both the Lu° 67 and the Chiggerville series show the same size reduction as seen in the Indian Knoll group, although in not so pronounced a degree. Because of this reduction, the Lu° 67 and the Chiggerville series themselves occupy a somewhat unique position among the eastern series.[22] So we have rather strong suggestions that while the bulk of the Shell Mound population was characterized by small size, there is also a component which was larger to be seen in the Lu° 25 series.

Perhaps we have a small variant of the basic eastern dolichocranic population, at least in the region of these sites. There does not seem to be any evidence that this small variant is necessarily earlier than the larger type or types.[23] We would be more inclined to postulate that this small variant is some sort of a local development, although the small cranial size and general gracility is perhaps reminiscent of some of the small people of, say, the Southwest (Hrdlička, 1931, pp. 91–94).

The larger-sized group, represented in the Lu° 25 series, fits more closely with various northeastern "Algonkin" series.

TOTAL SHELL MOUND SERIES

Variability of the Total Shell Mound Series

To increase the size of our Shell Mound series it seemed worthwhile to pool measurements and observations of the Lu° 25, Lu° 67, Ct° 27, and Lu° 61 crania. This pooling appears to be justifiable on cultural grounds, while the order of variability of the pooled series as indicated by the standard deviation should give us some idea of how justified it is on physical grounds.

In testing out the variability of the total Shell Mound series we again refer to von Bonin and Morant's average standard deviations for 14 American Indian male series, and to the standard deviations for the Utah Basket Maker male series. In addition we have included comparable figures for von Bonin and Morant's (1938, pp. 123–124) northeastern Algonkin male series.

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[21] We inquired as to inter-shell-mound cultural differences and received the following reply from J. R. Foster, who has had long experience with the shell mounds. His reply was, "Lu° 67 is different culturally from the other shell mounds [of Pickwick Basin]. Lu° 25 is in line with what we expected to find. Without going into detail Lu° 67 had no sitting burials; it had a different kind of atlatl [hook], and some other differences. Yet on the whole it corresponds to the general shell-mound pattern."

[22] Although as compared to von Bonin and Morant's pooled northeastern and east-central "Algonkin" series, Indian Knoll, Chiggerville, and Lu° 67 crania are small, their small size is not unparalleled in the eastern part of the country. For example, Miss M. V. Knight's "Southern New England Indian" series shows cranial and facial diameters similar to the Chiggerville and Lu° 67 series. But the large majority of so-called Algonkin series as seen in Hrdlička's catalog are quite a little larger.

Whether or not the small size of these Shell Mound series is unparalleled in the eastern area, their association in the same general cultural complex seems significant.

[23] Particularly in view of the fact that the five male skeletons underneath the shell mound, site Ct° 27, are not apparently this small type.

TABLE 10.—*Comparison of standard deviations of the total Shell Mound series with the total U. S. A. Indian, Utah Basket Maker, and northeastern Algonkin series*

Measurements (mm.) and indices	Males				Females
	Total Shell Mound	Total (14) U. S. A. Indian	Utah Basket Makers	North-eastern Algonkins	Total Shell Mound
Glabello-occipital length	(54) 5. 41±0. 35	(1, 093) 5. 42:14	(33) 3. 84±0. 32	(120) 5. 19±0. 23	(45) 4. 14±0. 29
Maximum breadth	(55) 4. 92± . 32	(1084) 4. 80:14	(33) 4. 77± . 40	(120) 4. 23± . 18	(49) 4. 18± . 28
Basion-bregma height	(28) 3. 86± . 35	(943) 4. 68:14	(30) 3. 58±. 31	(110) 5. 00± . 23	----------
Basion-nasion length	(28) 3. 10± . 28	(334) 3. 69: 6	(33) 3. 38± . 28	----------	----------
Upper facial height	(33) 3. 57± . 30	(839) 3. 94:14	(33) 4. 29± . 36	(70) 3. 44± . 20	(22) 4. 30± . 44
Bizygomatic breadth	(21) 5. 27± . 55	(741) 5. 41:13	(36) 4. 44± . 35	(77) 5. 98± . 33	----------
Nasal height	(39) 2. 61± . 28	(932) 2. 83:14	(41) 2. 50± . 19	(90) 2. 84± . 14	(28) 3. 14± . 28
Nasal breadth	(34) 2. 12± . 17	(928) 1. 79:14	(40) 1. 20±. 09	(89) 2. 22± . 11	(23) 1. 61± . 16
Length-breadth index	(52) 3. 24± . 21	(1, 073) 3. 12:14	(33) 3. 28± . 27	(120) 2. 95± . 13	(43) 2. 95± . 21
Nasal index	(32) 3. 83± . 32	(919) 4. 15:14	(40) 2. 95± . 22	(89) 4. 23± . 21	(20) 4. 12± . 44
Minimum frontal diameter	(54) 4. 55± . 29	----------	----------	----------	(44) 3. 06± . 22
Horizontal circumference	(45) 10. 31±. 71	----------	----------	----------	(36) 9. 88± . 79
Transverse arc	(21) 6. 94± . 72	----------	----------	----------	----------
Minimum breadth of ascending ramus	(21) 2. 17± . 23	----------	----------	----------	----------
Mandibular angle	(20) 6. 67± . 71	----------	----------	----------	----------
Length-height index	(26) 2. 43± . 23	----------	----------	----------	----------
Length-auric. height index	(20) 2. 37± . 25	----------	----------	----------	----------
Breadth-height index	(28) 4. 89± . 44	----------	----------	----------	----------
Fronto-parietal index	(51) 3. 00± . 20	----------	----------	----------	(44) 2. 53± . 18
Cranio-facial index	(20) 3. 76± . 40	----------	----------	----------	----------
Zygo-frontal index	(21) 1. 82± . 19	----------	----------	----------	----------

Comparing the total Shell Mound males with the U. S. A. Indian males, we find that out of 10 measurements and indices the former shows higher standard deviations in 3, the latter in 7. Possibly the only significant difference is in basion-bregma height where the U. S. A. series exceeds the total Shell Mound series by 0.76.[24] But even this difference is not necessarily a real one because of the small number in the total Shell Mound series. All in all, it seems safe to say that the total Shell Mound series shows about the same order of variability as the U. S. A. Indian series, and, if anything, the Shell Mound variability may be a little less.

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[24] We have already stated that the standard deviation for this measurement in the Lu° 25 series is overly low because of lumping of half the small series at 142 and 143 mm., and that greater numbers might smooth out the curve and raise the standard deviation. Twenty of the 28 individual measurements making up the total Shell Mound series are from Lu° 25 crania.

In making a comparison of the total Shell Mound series with the Basket Makers, we find that out of 10 measurements and indices the former shows higher standard deviations in 7, the latter in 3 (with small excesses of 0.24, 0.72, and 0.04). Those which may be significantly higher in the total Shell Mound series are glabello-occipital length, upper facial height, bizygomatic breadth, nasal breadth, and nasal index. Unquestionably the Basket Maker series is the least variable of the two on the basis of these incomplete data. This would suggest that our total Shell Mound series is by no means as homogeneous a group as can be found in native North America.

A comparison of the total Shell Mound series with the pooled northeastern Algonkin series yields the following: Out of nine measurements and indices the former shows higher standard deviations in four, the latter in five. The only difference of possible significance is the higher figure for the northeastern Algonkins in basion-bregma height (excess of 1.14). The variability, then, of the two series seems to be about of the same order.

Finally a comparison of the standard deviations of the total Shell Mound males with the total Shell Mound females is indicated. Ten measurements and indices are used, but they are different in a few cases from those used in the foregoing comparisons. In eight cases the male figures exceed those of the females, and in only two is it the other way around. The differences are large in the glabello-occipital length, maximum breadth, and minimum frontal diameter, and are probably indicative of a lower variability for these measurements in the females. Possibly the lower standard deviation for females in the length-breadth index is also significant. In upper facial height alone the males may show a significantly lower figure. So it seems that according to the available data the females are less variable than the males of the total Shell Mound series.

In summary it appears that the variability of the total Shell Mound series is about average for North American Indians if von Bonin and Morant's figures are considered representative. Certainly the Shell Mound series shows a higher degree of variability than the rather homogeneous Basket Maker series. Finally it is about as variable as the pooled crania from five northeastern States, which is by no means indicative of any great homogeneity.

For comparative purposes, then, we can use the means for the total Shell Mound series with about as much justification as one can utilize most of the 14 series listed by von Bonin and Morant.[25]

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[25] These series are from northern California; central California, San Francisco Bay and vicinity; Santa Barbara County; Santa Cruz and Santa Rosa Islands; Santa Catalina, San Clemente, and San Nicolas Islands; northeastern Algonkin area; east-central Algonkin area; western Algonkin area; central and northern Plains (Sioux); South Dakota (Arikara); Florida; Grand Gulch, Utah (Basket Makers), and Hawikuh, New Mexico (Old Zuñi). These series are all from Hrdlička (1927) and Gifford (1926).

Of course, more data may show that there are greater differences than we see now between the separate Shell Mound series which would prohibit pooling of their respective measurements and indices. But until such a contingency presents itself we can use the pooled Shell Mound series with fair assurance.

MORPHOLOGICAL FEATURES OF THE TOTAL SHELL MOUND CRANIAL SERIES [26]

Rather than present the morphological features of the total Shell Mound series in tabular form here, it is more expedient to summarize briefly the most pertinent data. The numbers and percentages for each category in each character are presented in table 32.

If we were to envisage a skull which showed the modal characteristics of the Shell Mound male crania, it would have the following appearance:

- Skull vault and base:
  - Ovoid head form.
  - Divided type browridges of medium size.
  - Small to medium glabellar prominence.
  - Medium frontal slope.
  - Medium to large postorbital constriction.
  - Small frontal bosses.
  - Small median frontal crest.* [27]
  - Medium-sized sagittal elevation.
  - Medium-sized mastoid processes.
  - Medium degree of sphenoid depression.*
  - Pronounced occipital curve.*
  - Lack of, or a small inion.*
  - Ridge-shaped occipital crest of medium size.
  - Lambdoid suture of medium to pronounced complexity.*
  - Sagittal suture of medium complexity.
  - Medium-sized styloid processes.
  - Submedium to medium pharyngeal fossa.
  - Glenoid fossae of medium depth.
  - Medium-sized postglenoid processes.
  - Medium to thick tympanic plates.
  - Oval-shaped auditory meatuses.*
- Facial skeleton:
  - Rhomboid-shaped orbits of small to medium inclination.*
  - Slight (shallow) suborbital fossae.*
  - Medium-size malars with pronounced anterior and lateral projection, and with medium-sized marginal processes.*
  - Medium to large thickness of zygomatic processes.
  - Small nasion depression.
  - Low nasal root of medium breadth.*
  - Dull to medium nasal sills.
  - Small nasal spine.*

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[26] Such features as occur in over 50 percent of the crania. Characters in which there is no clearly modal distribution are not included here.

[27] Asterisk * indicates similar modal distribution for female crania.

Facial skeleton—Continued.
- Medium total facial and midfacial prognathism.
- Slight to medium alveolar prognathism.
- Parabolic to elliptical-shaped palate of medium height.
- Absence of, or small palatine torus.*
- Bilateral chin form.
- Medium chin projection.*
- Slight alveolar prognathism of mandible.*
- Medium-sized genial tubercles.
- Medium-sized mylo-hyoid ridges.*
- Pronounced pterygoid attachments.
- Pronounced eversion of gonial angles.

COMPARISON OF THE TOTAL SHELL MOUND SERIES WITH VARIOUS "ALGONKIN" SERIES

CRANIAL DATA

In table 11 a comparison of von Bonin and Morant's (1938, p. 105) master series from the northeastern and east-central Algonkin areas and our pooled Shell Mound series is presented. For additional comparison, the component pooled series making up the two master series are added. Since there are no comparable data on females, we confine ourselves in this analysis to male series.

CRANIAL MEASUREMENTS AND INDICES

The glabello-occipital length of the Shell Mound series is considerably less than those of the dolichocranic northeastern Algonkins and their component series, but is only a little less than that of the east-central series. The means for the Shell Mound series and component 2b are identical.

The Shell Mound mean for maximum breadth is considerably less than those of the other series, but is most closely approached by component 1a of the northeastern group.

Despite the reduction in other vault diameters, the Shell Mound mean for basion-bregma height is as great as that of the dolichocranic series of large crania from New York State, Manhattan Island, Long Island, and Staten Island. It is slightly exceeded by the mesocranic east-central series and its components.

The means for the cranial module demonstrate the somewhat smaller vault of the Shell Mound series as compared to the others. Possibly part of this diminution is due to the presence of the rather small Lu° 67 crania in the total Shell Mound series.

TABLE 11.—*Cranial measurements and indices of the total Shell Mound, northeastern and east-central Algonkin series*

Measurements (mm.) and indices	Males						
	Total Shell Mound	North-eastern Algonkin	East-central Algonkin	Component 1a [1]	Component 1c [2]	Component 2a [3]	Component 2b [4]
Glabello-occipital length	(54)	(120)	(94)	(45)	(42)	(48)	(46)
	183.4	189.0	184.4	188.0	190.5	185.4	183.3
Maximum breadth	(55)	(120)	(93)	(45)	(42)	(48)	(45)
	134.2	138.3	139.2	137.7	139.5	139.7	138.6
Basion-bregma height	(28)	(110)	(64)	(41)	(38)	(30)	(34)
	140.4	139.0	141.6	137.9	140.4	141.5	141.6
Cranial module	(27)	(110)	(63)	(41)	(69)	(39)	(33)
	152.9	155.4	154.8	154.8	156.0	155.0	154.5
Length-breadth index	(52)	(120)	(93)	(45)	(42)	(48)	(45)
	73.4	73.2	75.5	73.2	73.3	75.4	75.7
Length-height index	(26)	(110)	(61)	(41)	(38)	(28)	(33)
	77.1	73.5	77.2	73.2	73.8	77.3	77.0
Breadth-height index	(28)	(110)	(62)	(40)	(38)	(29)	(33)
	103.8	100.5	101.7	99.9	100.7	100.8	102.4
Upper facial height	(33)	(70)	(36)	(22)	(21)	(12)	(24)
	71.0	74.5	74.1	75.2	73.8	72.8	74.8
Bizygomatic breadth	(21)	(77)	(31)	(26)	(23)	(12)	(34)
	140.8	138.2	140.1	137.5	138.8	139.9	141.6
Nasal height	(39)	(90)	(51)	(31)	(32)	(18)	(33)
	50.2	52.7	53.4	52.3	52.3	52.7	53.8
Nasal breadth	(34)	(89)	(52)	(31)	(32)	(17)	(35)
	25.5	26.1	26.3	25.6	25.6	27.1	25.9
Orbital height	(15)	(87)	(51)	(33)	(29)	(22)	(29)
	35.4	34.0	34.5	34.4	33.6	33.9	34.9
Orbital breadth (dacryal)	(7)	(85)	(51)	(33)	(29)	(22)	(29)
	41.2	39.3	39.2	39.3	39.4	38.7	39.6
Upper facial index	(10)	(60)	(20)	(18)	(24)	(9)	(11)
	51.3	53.7	52.4	54.4	52.6	51.6	53.2
Nasal index	(32)	(89)	(50)	(31)	(32)	(17)	(33)
	49.3	49.9	49.5	49.5	49.1	51.3	48.5
Orbital index (dacryal)	(7)	(85)	(51)	(33)	(29)	(22)	(29)
	86.7	86.6	87.9	87.5	85.4	87.7	88.1

[1] Component 1a: Ontario, Maine, Massachusetts, Connecticut, Rhode Island.
[2] Component 1c: New York, Manhattan Island, Long Island, Staten Island.
[3] Component 2a: New Jersey (Delaware), Pennsylvania, Maryland, Virginia.
[4] Component 2b: Ohio, Indiana, Michigan, Illinois.

The vault indices present perhaps the most interesting situation. In length-breadth index the Shell Mound and northeastern Algonkin series are identical, while the east-central series is several index units higher and, therefore, is barely mesocranic.

While the Shell Mound series mean for length-height index is considerably higher than those of the other dolichocranic series, it is matched by the mean of the mesocranic east-central series. In breadth-height index the Shell Mound series exceeds all the others, and is approached most closely by component 2b of the east-central series. In particular is the Shell Mound mean higher than those of the northeastern series and its components. All breadth-height indices are classed as acrocranic.

In short, the Shell Mound series has a greater vault height relative to vault breadth than any of the other series, and its vault height relative to vault length is greater than any of the other dolichocranic series.

FACIAL MEASUREMENTS AND INDICES

In upper facial height the Shell Mound series appears to be somewhat smaller than the others, but slightly exceeds the otherwise larger-sized northeastern series in mean bizygomatic breadth. In respect to facial width it is only slightly exceeded by component 2b of the east-central series. This makes for a lower upper facial index, which is only matched by component 2a of the east-central series. All means are classed as mesene, but the Shell Mound and component 2a series approach the euryene border of this category.

The Shell Mound series has a smaller nasal height concomitant to its lessened upper facial height, but the mean nasal breadth is no smaller than those of the other series. All the nasal indices are practically the same, although component 2a has a somewhat higher mean. With this exception, which is barely chamaerrhinic, the series fall in the middle ranges of mesorrhiny.

The mean orbital height for the Shell Mound series is somewhat higher than those of the other series, as is the mean orbital breadth.[28] Orbital indices, however, are practically identical in all the series.

SUMMARY OF INDICIAL FEATURES OF THE TOTAL SHELL MOUND SERIES [29]

Summarizing the indicial features of the total Shell Mound male and female series we find that both sexes are long-headed (dolichocranic, 73.4 and 74.3, respectively), high-headed (hypsicranic, 77.1 and 76.7, respectively; acrocranic, 103.8 and 103.3, respectively), with a forehead of over medium breadth relative to the braincase (eurymetopic, 69.5), and fairly narrow in relation to facial width (zygo-frontal index, 69.5) in males. In females the forehead–brain case (metriometopic, 68.6) and forehead–face (zygo-frontal index, 70.6) relationships are more moderate.

The width of the face in relation to the brain case is great in males and more average in females (cranio-facial index: males, 102.3; females, 97.4).

The amount of facial prognathism is medium in both sexes (mesognathous: males, 80.6°; females, 84.3°), with the females the more prognathous of the two. Both sexes show a pronounced amount of alveolar prognathism (males, 70.5°; females, 63.5°).

The face is medium in its proportions (mesoprosopic: males, 86.9; females, 86.4; and mesene: males, 51.3; females 52.8). The nasal aperture is medium in its relationships (mesorrhine: males, 49.3; females, 50.1) as are the orbits (mesoconch: males, 86.7 (82.9 using the breadth from maxillo-frontale); females, 86.6 (81.6)). The palate is externally broad (brachyuranic: males, 120.5; females, 120.5).

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[28] The differences are probably due to a sampling error in the total Shell Mound series.

[29] We have taken Neumann's (*in* Cole, and Deuel, 1937, pp. 227-264) conveniently compact form of summary as a model for the foregoing.

Summary

From the available measurements and indices the total Shell Mound series seems to fit in very well with the two Algonkin master series, particularly that from the northeastern area. It diverges somewhat from the norm of these series in its smaller-sized and relatively higher vault and its shorter vertical facial dimensions.

Therefore, we consider the Shell Mound series to represent an extension of an essentially eastern dolichocranic type into the Southeast. As we shall see later, the Shell Mound series are quite distinct from the brachycranic and mixed mesocranic population of this area. It is tempting to call the Shell Mound series "Algonkins" because of the close relationship to the "northeastern Algonkins"[30] themselves, but the assumptions necessary to such a course are too great for us to undertake, especially since some Iroquois series are hardly distinguishable from Algonkin series (Hrdlička, 1916, pp. 127–130). We prefer to state that in the Shell Mound series we have a group that fits most closely with the eastern dolichocranic type, but exhibits certain distinctive physical features, possibly local differentiations.

THE CT° 27 SUBMOUND SKELETONS

Because of the unusual circumstances of their interment it seems advisable to treat these submound skeletons separately. All five of these burials lay in the river sand below the base of the shell mound at depths ranging from about 11 to 14 feet from the mound surface. Three skeletons, Nos. 83, 84, and 85, were buried in a group at a depth of 13 feet 8 inches, and rested directly upon a 6-inch layer of shell below the sand. All of these are males, respectively young adult, middle-aged adult, and adolescent. Sudden death probably claimed them all since flint points were embedded in the vertebrae of two and the thoracic cavity of the third contained two such artifacts.

Nos. 88 and 92 are also males and were buried in the sand nearby, but were not in direct association with the other three skeletons. Because of this lack of direct association we have presented the means for all five skeletons [31] as well as the separate measurements and indices for the three burials grouped together.

Cranial Data: Metric Considerations

Metric analyses of such small series are generally very unsatisfactory. It seems utterly fruitless to compare the means of the submound series of five crania with the means for the Shell Mound series. Most assuredly there are a few differences, but it is almost equally sure that such differences are rendered void by the sampling error.

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[30] There is, of course, little more than presumptive evidence that the crania making up these series came from an Algonkin-speaking population.

[31] We have included No. 85, the adolescent male, since its vault diameters at least are as large as those of the other crania. It evidently did not attain full facial growth, however.

Possibly the best approach from the metric standpoint is to compare the individual figures for the three crania with the *ranges* for the total Shell Mound male series. This procedure, however, does not bear much fruit. No. 84, by virtue of its heavy mandible, has a minimum breadth of the ascending ramus outside the Shell Mound range, and both No. 84 and No. 85 have mandibular angles lower than the bottom range for the Shell Mound series. No. 83, because of its meager vault height relative to vault length and breadth, has a length-height and a length-auricular height index below the bottom of the Shell Mound range.

Other than these we can find no differences in the craniometric material. It is perhaps worth noting that there appears to be a fair degree of difference between the three skulls from a metric and morphological point of view. No. 84 and No. 85 are perhaps most alike, particularly in the conformation of the mandible (pls. 307 and 309) No. 83 (pl. 308) seems different from the other two in vault and face morphology, and incidentally can be matched closely by a skull or so from the Shell Mound group.

CRANIAL DATA: MORPHOLOGICAL CONSIDERATIONS

From the morphological aspect there are a few features in which the submound crania seem to be rather consistent. What consistencies there are fall in most cases in the medium category. Observations in which this occurs are: Postorbital constriction, sagittal elevation, sphenoid depression, occipital curve, pharyngeal tubercle, glenoid fossa depth, nasal root breadth, and palate height. In the suborbital fossa, most are slight; shape of occipital crest, all are ridge; anterior projection of malars, all large; lateral projection of malars, mostly large; zygomatic thickness, mostly large; chin form, mostly bilateral; and gonial angles eversion, mostly pronounced.

The following observations show possible differences between the submound crania and the Shell Mound series: In occipital curve all the submound crania are medium, whereas over half the Shell Mound series are pronounced. In inion development No. 84 is large, while the Shell Mound series in no cases show such development. Nos. 84 and 88 have large occipital crests, with only one Shell Mound skull attaining that size. In tympanic plate thickness 3 of the 5 submound crania are thick, while only 17.4 percent of the Shell Mound series fall in that category. In auditory meatus shape three of the five submound crania are elliptical, with only 18.2 percent of the Shell Mound series showing that form. Two submound crania (Nos. 84 and 85) show an absence of nasal sills, a condition found in no Shell Mound skull. Subnasal grooves are pronounced in two submound crania (Nos. 84 and 85), and in only 1 out of 20 Shell Mound skulls.

These differences possibly indicate that the submound crania relative to the Shell Mound series show a less protruding occiput, greater muscularity, and general ruggedness, and a prevalence of several characters usually bearing a "primitive" connotation (absence of nasal sills, presence of subnasal grooves). Of course, a number of more recent Indian crania would be expected to show some of these "primitive" features, so we hasten to state that we are not endeavoring to build up an "early man" in Alabama.

POSTCRANIAL DATA: METRIC CONSIDERATIONS

In long-bone dimensions the submound skeletons stay well within the Shell Mound ranges, except where No. 84 exceeds the top of the Shell Mound range in maximum diameter of the femoral head, and equals the top range in maximum diameter of the right humeral head. These circumstances, coupled with some of the observational data, seem to indicate that the submound skeletons are more rugged than the large majority of the Shell Mound skeletons.

SUMMARY

It must be confessed that we have not fully formulated our opinion as to the ethnic position of these submound skeletons. We would prefer to reexamine them in the light of the greater number of Shell Mound skeletons which have been recently restored. Our very tentative opinion, which we arrived at independently of one another, is that the submound skeletons may represent a more rugged variant of the Shell-Mound population. We do not believe they are to be classed as a distinct type.

THE "KOGER'S ISLAND" SERIES

The "Koger's Island" skeletal series are from two main sites: the Koger's Island cemetery proper (site Lu^v 92) and the intrusive cemetery in site Lu^o 25. There is also a single intrusive "Koger's Island" burial in site Lu^o 59 (skeleton No. 11). It is important to recognize that these "Koger's Island" skeletons from the top of the shell mounds are not separated from the Shell Mound skeletons by means of morphological typing but by their cultural associations. One could, however, closely approximate the cultural grouping by "typing" since the "Koger's Island" and Shell Mound types are usually easily distinguishable at little more than a glance.[32]

The first problem we are concerned with is the relationship of the Lu^v 92 Koger's Island series with the Lu^o 25 "Koger's Island" type series. To the eye the crania appear very similar. The question is, does the metric material back up this morphological judgment? In analyzing the means of the series, we followed the same tactics of checking differences between the males with those of the female series.

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[32] For cranial measurements and indices of these two groups, see table 12, pp. 434-435.

TABLE 12.—*Cranial measurements and indices of the Shell Mound and "Koger's Island" series* [1]

Measurements (mm.) and indices	Males					Females				
	Lu^{v} 92	Lu^{o} 25 K. I.	Lu^{o} 25 S. M.	Total Shell Mound	Total "Koger's Island"	Lu^{v} 92	Lu^{o} 25 K. I.	Lu^{o} 25 S. M.	Total Shell Mound	Total "Koger's Island"
Glabello-occipital length	(10) 174.7*	(10) 173.2*	(39) 185.3	(54) 183.4	(20) 174.0*	(8) 167.4*	(13) 161.7*	(32) 176.7	(45) 176.4	(22) 164.1*
Maximum breadth	(10) 147.4*	(10) 143.5*	(39) 133.7	(55) 134.2	(20) 145.4*	(8) 139.2*	(14) 140.1*	(34) 131.1	(49) 131.0	(22) 139.8*
Basion-bregma height	(10) 143.2*	(7) 143.7*	(20) 141.6	(28) 140.4	(25) 143.5*	(5) 136.4*	(10) 138.6*	(12) 136.8	(19) 135.2	(15) 137.9*
Cranial module	(13) 155.4	(9) 154.3	(20) 153.6	(27) 152.9	(23) 155.0	(9) 148.4	(7) 147.2	(8) 148.4	(17) 147.5	(20) 147.8
Auricular height	(10) 120.3*	-------	(7) 120.6	(21) 119.3	---------	(7) 120.3*	-------	(2) 114.5	(12) 115.4	---------
Minimum frontal diameter	(20) 95.2	(15) 96.4	(39) 93.4	(54) 93.4	(36) 95.7	(13) 91.5	(14) 91.9	(30) 89.7	(44) 89.5	(27) 91.5
Horizontal circumference	(8) 510.8*	(8) 503.6*	(33) 508.0	(45) 506.0	(16) 507.2*	(5) 488.6*	(11) 480.3*	(25) 492.5	(36) 492.2	(16) 482.9*
Nasion-opisthion arc	(8) 359.3*	-------	(5) 380.8	(14) 371.5	---------	(3) 352.0*	-------	(1) 365.0	(11) 359.1	---------
Transverse arc	(8) 326.6*	-------	(8) 316.2	(21) 310.6	---------	(6) 316.8*	-------	(2) 302.0	(13) 300.4	---------
Basion-nasion length	(12) 104.5	(10) 104.9	(20) 103.0	(28) 103.2	(23) 104.5	(10) 98.8	(11) 98.4	(11) 100.6	(18) 99.4	(22) 98.5
Basion-prosthion length	(9) 99.0	(8) 98.9	(14) 97.4	(18) 97.4	(18) 98.8	(8) 97.9	(7) 92.7	(6) 97.7	(9) 96.7	(16) 95.5
Length-breadth index	(10) 84.4*	(8) 82.0*	(37) 72.8	(52) 73.4	(18) 83.6*	(7) 83.6*	(12) 86.7*	(30) 74.4	(43) 74.3	(19) 85.6*
Length-height index	(9) 83.0*	(7) 82.4*	(20) 77.1	(26) 77.1	(16) 82.7*	(4) 81.8*	(10) 85.5*	(9) 77.5	(18) 76.7	(22) 84.4*
Length-auricular height index	(9) 70.6*	-------	(7) 65.0	(20) 65.8	---------	(5) 72.0*	-------	(2) 64.7	(13) 65.5	---------
Breadth-height index	(9) 96.7*	(7) 99.4*	(20) 105.0	(28) 103.8	(16) 97.9*	(5) 97.2*	(10) 98.6*	(11) 104.1	(18) 103.3	(15) 98.1*
Fronto-parietal index	(10) 65.3*	(9) 67.9*	(37) 69.7	(51) 69.5	(16) 67.2*	(6) 64.7*	(11) 65.4*	(31) 68.4	(44) 68.6	(17) 65.2*
Total facial height	(8) 125.5	-------	(5) 119.6	(13) 119.2	---------	(8) 114.8	-------	(1) 117.0	(9) 112.2	---------
Upper facial height	(8) 750.8	(13) 70.7	(26) 71.2	(33) 71.0	(22) 73.0	(9) 64.0	(9) 65.2	(18) 66.5	(22) 66.0	(18) 64.6
Bizygomatic breadth	(13) 144.6	(4) 138.8	(14) 138.1	(21) 140.8	(19) 142.2	(10) 131.5	(5) 131.6	(10) 126.8	(16) 127.9	(15) 131.5
Total facial angle	(9) 85.3	-------	(4) 86.2	(10) 84.3	(9) ---------	(9) 83.0	-------	-------	(5) 80.6	---------
Midfacial angle	(9) 90.3	-------	(6) 88.5	(15) 87.3	---------	(9) 89.0	-------	(2) 88.0	(8) 87.1	---------
Alveolar angle	(8) 70.2	-------	(3) 72.3	(8) 70.5	---------	(9) 64.0	-------	-------	(5) 63.2	---------
Nasal height	(11) 53.3	(14) 52.0	(28) 51.5	(39) 50.2	(26) 52.7	(9) 48.1	(11) 48.7	(19) 48.2	(28) 47.6	(22) 48.3
Nasal breadth	(10) 25.3	(11) 26.3	(25) 25.7	(34) 25.5	(22) 25.8	(6) 24.7	(8) 23.6	(12) 24.1	(23) 24.4	(15) 23.9
Orbital height	(14) 35.4	-------	(7) 36.2	(15) 35.4	---------	(9) 34.0	-------	(1) 36.0	(10) 34.3	---------
Orbital breadth (dacryal.)	(7) 41.0	-------	(3) 42.6	(7) 41.2	---------	(5) 40.4	-------	-------	(6) 39.0	---------
Orbital breadth (mf.)	(13) 43.0	-------	(7) 42.7	(14) 42.3	---------	(7) 42.8	-------	-------	(7) 42.0	---------
External palatal length	(14) 54.7	-------	(4) 51.2	(11) 52.8	---------	(7) 53.7	-------	(1) 53.0	(8) 51.9	---------
External palatal breadth	(12) 69.1	-------	(2) 63.0	(9) 63.0	---------	(7) 65.4	-------	(1) 62.0	(10) 61.6	---------
Condylo-symphyseal length	(21) 104.3	-------	(7) 98.3	(19) 98.8	---------	(14) 101.9	-------	(2) 95.5	(12) 97.2	---------

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[1] Asterisk * indicates measurements and indices affected by deformation. In such cases only crania with slight deformation or no deformation are used in the series.

TABLE 12.—*Cranial measurements and indices of the Shell Mound and "Koger's Island" series* [1]—Continued

Measurements (mm.) and indices	Males					Females				
	Lu^{v} 92	Lu^{o} 25 K. I.	Lu^{o} 25 S. M.	Total Shell Mound	Total "Koger's Island"	Lu^{v} 92	Lu^{o} 25 K. I.	Lu^{o} 25 S. M.	Total Shell Mound	Total "Koger's Island":
Bicondylar breadth	(18) 130.3	-------	(5) 129.4	(14) 125.6	---------	(14) 120.9	-------	(1) 122.0	(9) 115.6	---------
Bigonial breadth	(18) 107.6	-------	(7) 106.0	(18) 102.6	---------	(15) 98.5	-------	(2) 97.0	(14) 96.3	---------
Symphysis height	(17) 36.9	-------	(3) 36.8	(10) 34.2	---------	(9) 35.1	-------	(1) 30.0	(11) 31.9	---------
Minimum breadth of ascending ramus	(25) 35.1	-------	(7) 34.0	(21) 33.9	---------	(16) 32.9	-------	(2) 30.6	(18) 32.6	---------
Mandibular angle	(20) 114.8°	-------	(7) 117.1°	(20) 117.6°	---------	(16) 123.9°	-------	(2) 126.0°	(12) 120.0°	---------
Total facial index	(7) 88.5	-------	(3) 87.0	(7) 86.9	---------	(6) 86.3	-------	(1) 91.4	(6) 86.4	---------
Upper facial index	(8) 52.8	(5) 50.1	(8) 50.8	(10) 51.3	(14) 52.2	(7) 52.3	(4) 50.5	(8) 52.9	(10) 52.8	(11) 51.7
Nasal index	(9) 47.0	(12) 50.6	(23) 50.4	(32) 49.3	(22) 48.9	(6) 51.5	(8) 49.3	(13) 50.3	(20) 50.1	(14) 50.3
Orbital index (dacryal.)	(7) 86.1	-------	(3) 88.4	(7) 86.7	---------	(5) 81.9	-------	-------	(6) 86.6	---------
Orbital index (mf.)	(11) 82.9	-------	(7) 84.8	(13) 82.9	---------	(7) 77.8	-------	-------	(7) 81.6	---------
External palatal index	(12) 126.1	-------	(2) 129.2	(8) 120.5	---------	(7) 122.0	-------	(1) 117.0	(7) 120.5	---------
Cranio-facial index	(8) 98.3*	(3) 98.8*	(13) 102.6	(20) 102.3	(11) 98.4*	(7) 89.0*	(5) 92.9*	(12) 96.6	(17) 97.4	(9) 92.2*
Zygo-gonial index	(12) 73.9	-------	(4) 77.0	(10) 73.8	---------	(9) 74.5	-------	(1) 79.7	(6) 74.0	---------
Fronto-gonial index	(13) 111.8	-------	(7) 112.1	(18) 110.8	---------	(12) 107.5	-------	(2) 110.7	(12) 106.2	---------
Zygo-frontal index	(12) 66.2	(5) 68.8	(14) 68.7	(21) 69.0	(17) 67.1	(8) 70.5	(4) 72.3	(9) 71.4	(16) 70.6	(12) 71.1
Mandibular index	(18) 79.8	-------	(6) 77.1	(15) 79.7	---------	(14) 83.6	-------	(1) 79.5	(8) 83.4	---------

[1] See footnote 1, p. 434.

INTERSITE COMPARISON OF THE "KOGER'S ISLAND" SERIES

CRANIAL DATA

Up to this point we have been dealing with undeformed skulls, but since the present series show occipital and fronto-occipital deformation in the large majority, it is necessary to make some revision of the methods used. For Lu^{v} 92, only those crania with deformation classed as "trace" or "slight" and those with no apparent deformation are used in measurements and indices generally considered to be influenced by deformation.[33] This procedure by no means eliminates the deformation problem, but merely affords closer approximations to the undeformed means than otherwise would be possible.[34]

In the following analysis it must be remembered that the series are small, sometimes represented in critical measurements by only seven individuals in one or other of the series. Because of this paucity of material, even the checking of the female series with differences in the males does not indicate that there necessarily were such differences in the respective populations. Such checking merely increases the chances of this occurring.

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[33] All measurements and observations on this cranial series were done by Newman. Snow measured all the "Koger's Island" type crania from Lu^{o} 25, and isolated those skulls which showed anything more than slight deformation from the others.

[34] If our series were larger and afforded more undeformed crania, Shapiro's (1928, p. 18) correction formula might be used to make the approximations closer.

Following down the list of measurements and indices, it is first apparent that the Lu^{v} 92 male and female means exceed those of Lu^{o} 25 "Koger's Island" [35] in the following: Glabello-occipital length, cranial module, horizontal circumference, upper facial index and cranio-facial index. Conversely Lu^{o} 25 K. I. males and females are greater in basion-bregma height, minimum frontal diameter, breadth-height index, fronto-parietal index and zygo-frontal index. The putative differences in proportions are not always explicable from the means of their component measurements. At least the somewhat higher Lu^{o} 25 K. I. breadth-height index seems to be due to a slightly greater basion-bregma height, and their higher fronto-parietal and zygo-frontal indices can be laid mainly to a greater minimum frontal diameter and in the latter possibly to a somewhat small bizygomatic diameter.

It is worth noting that 7 of these 10 consistent differences are in measurements and indices likely to be affected by deformation. These are the only consistent differences between male and female series; the other measurements and indices are very similar or their differences are not consistent between all series.

In summary, then, we cannot consider the Lu^{v} 92 and Lu^{o} 25 K. I. series identical, but they appear to be enough alike to be classed as one type. And this type we feel quite sure is that of the Southeastern brachycephal described by Hrdlička (1922, pp. 89–117, 130–131).

All four series are brachycranic, and even a generous allowance for deformation probably does not render them otherwise. They are very high headed relative to length and, doubtless, would still be hypsicranic if they were undeformed. The breadth-height indices vary from high metriocrany to low acrocrany. If undeformed they would probably be in the metriocranic category. The minimum frontal diameter is narrow relative to the maximum breadth (stenometopic) in the Lu^{v} 92 series and in the Lu^{o} 25 K. I. females. In the Lu^{o} 25 K. I. males the relationship is medium (metriometopic). Perhaps allowing for deformation all would be metriometopic. Relative to bizygomatic breadth, the minimum frontal diameter of the Lu^{v} 92 males is quite narrow (zygo-frontal index, 66.2), but this relationship is more medium (68.8) in the Lu^{o} 25 K. I. males. Both female series have a greater minimum frontal diameter relative to face breadth (Lu^{v} 92, 70.5; Lu^{o} 25 K. I., 72.3).

The Lu^{v} 92 males have a small amount of total facial prognathism (orthognathous, 85.3°) while the females of the same series are mesognathous (83.0°). Both series show pronounced alveolar prognathism

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[35] Henceforward called Lu^{o} 25 K. I.

(males, 70.5°; females, 64.0°). Both Lu^{v} 92 series are medium in facial proportions (mesoprosopic: males, 88.5; females, 86.3; mesene: males, 52.8; females, 52.3). In upper facial proportions alone the Lu^{o} 25 K. I. series are barely over the euryene–mesene line (males, 50.1; females, 50.5). In nasal proportions there is considerable variation. The Lu^{v} 92 males are almost leptorrhine (47.0), while the females from the same site are barely chamaerrhinic (51.5). Such differences can only be due to the small samples. The Lu^{o} 25 K. I. series are both mesorrhine (males, 50.6; and the females, 49.3). In orbital proportions the Lu^{v} 92 males are mesoconch, whereas the females are in the low mesoconch category, using the breadth from dacryon, and chamaeconch using the maxillo-frontale breadth. Both Lu^{v} 92 series have very broad palates (brachyuranic: males, 126.1; females, 122.0).

POSTCRANIAL DATA

The size of the Lu^{v} 92 male series is in most cases fairly adequate. The females from Lu^{v} 92 are smaller in number and both Lu^{o} 25 K. I. series are meagerly represented. For this reason differences between the two sites are quite uncertain.

Results of the comparison are as follows: The Lu^{v} 92 males exceed the Lu^{o} 25 males in all length, head, and shaft diameters (17) at our disposal except fibulae length. The differences are most striking in femoral and tibial lengths. There is, however, no such definite trend in the female series. While Lu^{o} 25 K. I. females are greater in femoral lengths, the Lu^{v} 92 females show the greater number of consistent excesses in head and shaft diameters (5 cases to 2). In the remaining diameters the females are substantially equal, or the data are equivocal.

TABLE 13.—*Postcranial measurements and indices of all the Pickwick series*

Measurements (mm.) and indices	Males							
	Lu° 67		Lu° 25 S. M.		Lu° 25 K. I.		Luᵛ 92	
	R	L	R	L	R	L	R	L
Femur:								
Maximum length	(13) 442.8	(14) 440.2	(21) 443.3	(14) 442.8	(7) 439.9	(7) 438.4	(31) 449.8	(29) 451.0
Bicondylar length	(12) 438.7	(14) 435.9	(20) 438.0	(14) 440.1	(8) 433.5	(6) 430.8	(27) 449.0	(27) 449.0
Maximum diameter of head	(19) 44.5	(17) 43.6	(27) 45.1	(25) 44.5	(10) 45.9	(8) 45.8	(30) 46.4	(29) 46.4
Antero-posterior subtrochanteric diameter	(18) 24.9	(18) 26.2	(31) 26.1	(29) 25.8	(10) 25.2	(10) 26.5	(32) 26.8	(29) 27.5
Lateral subtrochanteric diameter	(22) 24.6	(21) 24.7	(31) 31.3	(29) 30.0	(10) 31.8	(10) 31.0	(31) 33.3	(31) 32.0
Antero-posterior mid-shaft diameter	(22) 29.1	(21) 28.5	(30) 29.4	(29) 29.9	(10) 28.8	(8) 28.9	(31) 31.1	(31) 32.1
Lateral mid-shaft diameter	(22) 24.6	(21) 24.2	(31) 25.0	(30) 25.1	(9) 25.7	(9) 25.8	(32) 28.1	(31) 27.4
Platymeric index	(18) 83.8	(19) 89.2	(30) 83.3	(28) 86.2	(10) 81.0	(10) 87.2	(31) 90.6	(29) 85.2
Mid-shaft index	(22) 88.8	(21) 87.2	(30) 85.6	(28) 83.6	(9) 85.5	(8) 90.7	(31) 90.5	(31) 90.6
Tibia:								
Maximum length	(9) 360.9	(11) 362.0	(23) 363.9	(15) 368.2	(7) 361.4	(4) 376.0	(18) 377.2	(19) 375.4
Antero-posterior diameter at nutrient foramen	(21) 34.6	(19) 34.5	(28) 37.0	(25) 36.8	(8) 36.2	(6) 37.2	(31) 37.8	(29) 37.5
Lateral diameter at nutrient foramen	(21) 22.0	(20) 22.3	(27) 23.0	(25) 22.8	(10) 23.1	(6) 22.2	(31) 24.1	(29) 24.0
Antero-posterior diameter at mid-shaft	(21) 30.6	(21) 30.7	(22) 32.6	(23) 33.0	(10) 32.6	(5) 33.8	(31) 34.3	(29) 33.9
Lateral diameter at mid-shaft	(21) 20.3	(21) 20.6	(29) 20.9	(25) 21.0	(9) 21.1	(6) 20.5	(30) 21.9	(30) 21.6
Platycnemic index	(21) 64.4	(19) 64.1	(24) 61.4	(22) 62.6	(10) 64.0	(6) 59.2	(32) 69.7	(31) 64.2
Mid-shaft index	(21) 66.5	(21) 66.5	(25) 64.2	(22) 64.1	(10) 65.1	(6) 61.2	(30) 62.1	(29) 64.9
Humerus:								
Maximum length	(10) 318.0	(9) 313.1	(20) 320.7	(18) 318.7	(5) 322.5	(5) 318.9	(31) 326.8	(19) 320.9
Maximum diameter of head	(11) 43.6	(11) 44.3	(21) 45.2	(19) 44.8	(6) 46.2	(8) 44.9	(32) 46.5	(19) 45.4
Maximum diameter at mid-shaft	(18) 23.0	(20) 21.8	(29) 23.8	(26) 22.0	(9) 24.1	(10) 22.2	(36) 24.0	(25) 22.6
Minimum diameter at mid-shaft	(18) 16.6	(20) 15.6	(29) 17.2	(26) 15.9	(9) 17.6	(10) 16.7	(37) 17.7	(24) 17.0
Mid-shaft index	(18) 72.6	(21) 74.2	-------	-------	-------	-------	(33) 74.6	(29) 74.9
Ulna:								
Maximum length	(10) 266.5	(12) 262.7	(11) 263.6	(7) 261.9	(4) 265.5	(6) 260.5	(16) 272.6	(14) 273.4
Radius:								
Maximum length	(9) 244.9	(10) 242.9	(13) 245.0	(12) 245.3	(8) 249.7	(4) 240.5	(21) 253.9	(16) 255.4
Clavicle:								
Maximum length	-------	-------	(12) 150.5	(10) 148.5	(4) 157.5	(8) 154.2	(24) 156.1	(20) 155.7
Humero-femoral index	(8) 72.8	(5) 72.2	(13) 74.0	(13) 72.9	(3) 74.0	(5) 73.8	(23) 72.6	(17) 62.1
Tibio-femoral index	(7) 80.9	(7) 82.3	(15) 83.7	(9) 82.2	(3) 83.5	(2) 82.0	(17) 83.3	(16) 82.6
Humero-radial index	(4) 77.8	(6) 76.7	(10) 76.9	(11) 78.4	(4) 77.2	(4) 77.8	(17) 78.4	(17) 79.0

TABLE 14.—*Postcranial measurements and indices of all the Pickwick series*

Measurements (mm.) and indices	Females							
	Lu° 67		Lu° 25 S. M.		Lu° 25 K. I.		Lu^{v} 92	
	R	L	R	L	R	L	R	L
Femur:								
Maximum length	(11) 404.6	(9) 403.7	(8) 421.8	(6) 414.2	(6) 411.5	(7) 422.9	(17) 412.8	(16) 412.0
Bicondylar length	(11) 400.6	(10) 401.7	(9) 414.2	(8) 409.8	(6) 413.8	(7) 419.4	(17) 407.1	(15) 407.5
Maximum diameter of head	(11) 39.6	(14) 39.6	(17) 39.9	(16) 39.8	(7) 39.4	(8) 40.1	(17) 40.5	(15) 39.8
Antero-posterior subtrochanteric diameter.	(14) 22.5	(15) 23.6	(18) 22.9	(18) 23.4	(6) 22.5	(8) 22.6	(15) 24.2	(17) 23.9
Lateral subtrochanteric diameter	(14) 28.1	(14) 28.5	(19) 28.8	(18) 27.6	(7) 28.9	(8) 27.5	(19) 29.3	(17) 28.5
Antero-posterior mid-shaft diameter	(15) 24.2	(13) 24.5	(19) 25.2	(18) 25.2	(10) 32.6	(5) 34.4	(19) 25.8	(17) 25.1
Lateral mid-shaft diameter	(15) 24.0	(14) 23.8	(19) 23.0	(18) 23.0	(9) 21.1	(6) 20.5	(18) 23.8	(17) 24.3
Platymeric index	(14) 79.9	(14) 82.0	(18) 79.9	(17) 85.8	(7) 76.6	(8) 82.5	(20) 83.3	(19) 81.3
Mid-shaft index	(15) 96.8	(14) 96.6	(18) 92.3	(17) 93.1	(7) 89.9	(8) 93.5	(20) 93.8	(19) 97.5
Tibia:								
Maximum length	(4) 330.8	(5) 327.2	(8) 336.5	(10) 337.9	(3) 353.2	(4) 360.5	(10) 336.0	(10) 337.2
Antero-posterior diameter at nutrient foramen	(13) 30.0	(13) 30.0	(19) 30.5	(19) 30.8	(6) 31.2	(5) 31.8	(16) 31.9	(18) 31.2
Lateral diameter at nutrient foramen	(21) 17.4	(13) 18.5	(19) 20.1	(18) 18.8	(6) 18.6	(5) 20.0	(16) 21.5	(18) 20.8
Antero-posterior diameter at mid-shaft	(13) 26.4	(13) 26.5	(20) 26.6	(19) 27.2	(4) 27.5	(5) 28.8	(16) 28.8	(18) 28.4
Lateral diameter at mid-shaft	(13) 17.4	(13) 18.5	(18) 18.3	(17) 18.8	(5) 18.6	(5) 18.4	(16) 19.4	(18) 18.8
Platycnemic index	(13) 70.5	(14) 69.2	(16) 67.4	(15) 65.5	(6) 66.0	(6) 65.8	(13) 69.7	(16) 68.1
Mid-shaft index	(13) 67.2	(13) 67.9	(16) 70.7	(15) 71.0	(6) 66.0	(6) 67.7	(13) 69.7	(16) 68.1
Humerus:								
Maximum length	(4) 287.0	(7) 292.7	(6) 313.8	(13) 300.8	(5) 302.1	(4) 301.5	(14) 300.9	(13) 300.5
Maximum diameter of head	(5) 38.7	(9) 38.7	(11) 40.4	(15) 40.6	(7) 39.0	(6) 38.7	(14) 39.5	(12) 39.5
Maximum diameter at mid-shaft	(13) 20.1	(12) 18.9	(19) 20.7	(18) 19.9	(6) 20.8	(7) 19.9	(17) 20.8	(15) 20.3
Minimum diameter at mid-shaft	(13) 13.7	(13) 13.2	(19) 14.7	(18) 14.2	(6) 15.3	(7) 14.7	(16) 15.4	(15) 15.4
Mid-shaft index	(13) 67.9	(12) 70.1	-------	-------	-------	-------	(13) 74.1	(15) 75.8
Ulna: Maximum length	(8) 240.0	(6) 243.5	(2) 249.5	(6) 247.5	(5) 248.9	(5) 249.5	(11) 245.1	(11) 244.3
Radius: Maximum length	(6) 224.5	(7) 227.1	(7) 230.2	(3) 225.2	(2) 230.0	(3) 221.8	(16) 228.2	(11) 228.9
Clavicle: Maximum length	-------	-------	(6) 141.2	(5) 144.5	(3) 145.3	(2) 148.0	(8) 137.6	(12) 143.5
Humero-femoral index	(5) 72.8	(4) 72.2	(3) 72.5	(6) 73.8	(3) 72.7	(5) 71.0	(12) 72.9	(9) 76.4
Tibio-femoral index	(4) 81.5	(5) 81.6	(5) 82.2	(4) 84.2	(2) 83.5	(4) 83.0	(9) 82.3	(7) 83.3
Humero-radial index	(2) 75.0	(4) 75.5	(5) 76.4	(5) 73.4	(2) 77.0	(3) 77.7	(11) 74.7	(9) 76.4

In shaft indices of the femur the male data are equivocal, while the Lu^{v} 92 females show higher figures. Except for the Lu^{v} 92 males, most of the means for the platymeric index fall in the platymeric category. In shaft indices of the tibia the Lu^{v} 92 series are greater in the platycnemic index, yet all are mesocnemic, while the Lu^{v} 92 females show a slightly higher mean for the mid-shaft index.

There are no consistent proportional differences in the humero-femoral, tibio-femoral, and humero-radial indices—a fact which indicates, if anything, a similarity in these respects between the series.

In summary, the consistent size excess of the Lu^{v} 92 males appears to be largely a matter of sample rather than a real interseries difference. If the Lu^{v} 92 females showed the same degree of size excess the chances might be in favor of a real difference, but such is not the case.[36] As with the cranial data, we must conclude that while the Lu^{v} 92 and Lu^{o} 25 K. I. series are not identical, they are not different enough to be considered representative of different populations. Probably larger series would even out some of the apparent differences.

MORPHOLOGICAL FEATURES OF THE LU^{v} 92 CRANIAL SERIES

Unfortunately, time did not permit us to include morphological observations on the recently restored Lu^{o} 25 "Koger's Island" series, so we content ourselves with a summary presentation of these data for Lu^{v} 92. The actual numbers and percentages for each observation are given in table 32.

Since most of the crania in the Lu^{v} 92 series exhibit artificial deformation, a brief discussion of this feature is indicated before the modal morphological features are discussed. In 22 male and 15 female crania the deformation is predominantly of the usual occipital type, although in 3 cases the center of pressure appears to be in the lambdoid region,[37] and in 10 cases the deformation of the occiput extended to the lambdoid region as well. Two distinct cases of fronto-occipital deformation are present in the males.[38] Three crania apparently are undeformed.

A hypothetical skull showing the modal characteristics of the Lu^{v} 92 male series would have the following appearance:

Skull vault and base:
  Divided type browridges of large size.
  Large glabellar prominence.
  Medium to pronounced frontal slope.
  Medium postorbital constriction.
  Small to medium-sized frontal bosses.*[39]
  Absence of, or small median frontal crest.*
  Medium sagittal elevation.
  Medium to large temporal fullness.
  Medium to large degree of sphenoid depression.
  Small occipital curve.*
  Small-sized inion.
  Ridge-shaped occipital crest of medium size.
  Lambdoid and coronal* sutures of medium to pronounced complexity.
  Sagittal suture of medium complexity.

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[36] It is conceivable that the female head and shaft diameters in large part reflect habitus characters brought about by the hard work which was usually the lot of Indian women. Such a situation would tend to mask interseries differences.

[37] As Hooton (1930, p. 38) has indicated, lambdoid deformation may not be artificial, but rather appears to be a common phenomenon accompanying mixture of peoples of contrasting head form.

[38] There are five such cases in the Lu^{o} 25 "Koger's Island" series.

[39] Asterisk * indicates similar modal distribution for female crania.

Medium-sized styloid processes.
Medium to large pharyngeal tubercle.
Medium-sized pharyngeal fossa.
Glenoid fossae of medium depth.
Medium-sized postglenoid processes.
Medium to thick tympanic plates.
Ellipse-shaped auditory meatuses.

Facial skeleton:

Oblong to rhomboid-shaped orbits* of small to medium inclination.
Slight (shallow) to medium suborbital fossae.*
Medium to large-sized malars with pronounced anterior* and lateral* projection.
Medium thickness of zygomatic processes.
Small nasion depression.*
Low nasal root* of large breadth.
Sharp to medium nasal sills.*
Small nasal spine.*
Medium total facial prognathism.
Slight midfacial prognathism.*
Pronounced alveolar prognathism.*
Palate of medium height.*
Absence of, or small palatine torus.*
Bilateral chin form.
Medium chin projection.*
Slight to medium alveolar prognathism of mandible.*
Small to medium-sized genial tubercles.*
Medium-sized mylo-hyoid ridges.
Pronounced pterygoid attachments.
Pronounced eversion of gonial angles.

VARIABILITY OF THE "KOGER'S ISLAND" SERIES

Since the differences between Lu^v 92 and Lu^o 25 K. I. series appear to be small, we feel justified in pooling them to form a total "Koger's Island" series. This affords us larger series for comparative purposes and also permits us to test out matters of variability.

We have calculated statistical constants for all measurements and indices numbering 20 and over. Standard deviations for metric data affected by deformation are of questionable value, although as we have stated, in such cases only undeformed and slightly deformed crania were used.

Comparing the standard deviations of the pooled "Koger's Island" males with those of the pooled Shell Mound males the following is evident. In five cases out of nine the "Koger's Island" series shows the higher constants. Of these, only the differences in basion-nasion length and upper facial height seem to be of any magnitude. The standard deviations for nasal height are practically identical. Of the three cases in which the pooled Shell Mound series excells, only the difference between constants in glabello-occipital length is great. If these differences are large enough to indicate anything, they would seem to suggest a slightly higher order of variability for the pooled "Koger's Island" series.[40]

TABLE 15.—*Comparison of the standard deviations for the total "Koger's Island" series with the total Shell Mound, total U. S. A. Indian, and Florida series* [1]

Measurements (mm.) and indices	Males				Females	
	Total "Koger's Island"	Total Shell Mound	Total U. S. A. Indian	Total Florida	Total "Koger's Island"	Total Shell Mound
Glabello-occipital length	*(20) 4. 39±0. 47	(54) 5. 41±0. 35	(1, 093) 5. 42:14	(121) 5. 26±0. 23	*(22) 5. 62±0. 57	(45) 4. 14±0. 29
Maximum breadth	*(20) 5. 16± . 55	(55) 4. 92± . 32	(1, 084) 4. 80:14	(121) 5. 63± . 24	*(22) 4. 91± . 50	(49) 4. 18± . 28
Minimum frontal diameter	(35) 4. 01± . 32	(54) 4. 55± . 29	----------	------------	(27) 4. 41± . 40	(44) 3. 06± . 22
Basion-nasion length	(24) 5. 14± . 50	(28) 3. 10± . 40	(264) 4. 57:5	------------	(22) 3. 97± . 40	------------
Upper face height	(22) 4. 60± . 47	(33) 3. 57± . 30	(839) 3. 94:14	(65) 4. 19± . 25	------------	(22) 4. 30± . 44
Nasal height	(26) 2. 59± . 25	(39) 2. 61± . 20	(932) 2. 83:14	(75) 2. 85± . 16	(22) 3. 19± . 32	(28) 3. 14± . 28
Nasal breadth	(22) 1. 84± . 18	(34) 2. 12± . 17	(928) 1. 79:14	(73) 1. 81± . 10	------------	(23) 1. 61± . 16
Nasal index	(22) 4. 10± . 41	(32) 3. 83± . 32	(1, 073) 3. 12:14	(73) 3. 69± . 21	------------	(20) 4. 12± . 44
Cranial module	(23) 2. 78± . 27	(27) 2. 99± . 27	----------	------------	(20) 2. 52± . 27	------------

[1] Asterisk * indicates crania with only slight or no deformation.

In the four cases where comparable standard deviations are available for the pooled "Koger's Island" and Shell Mound female series, the former shows higher constants for glabello-occipital length, maximum breadth, and minimum frontal diameter. In these three cases the differences are quite large (1.48, 0.73, 1.35, respectively). The constants for nasal height are practically the same. So these scanty data strengthen the suggestion that the pooled "Koger's Island" series are somewhat more variable than the pooled Shell Mound series.

In a comparison with the total U. S. A. averages for the standard deviation, the pooled "Koger's Island" series show higher figures in four out of seven cases. The differences for nasion-basion length, upper facial height, and nasal index are fairly large, particularly the latter. Constants for nasal breadth are essentially the same. In the two cases where the total U. S. A. series show higher standard deviations, only the difference for glabello-occipital length is large (1.03). Thus if anything can be said, the pooled "Koger's Island" male series shows somewhat greater variability than the total U. S. A. series.[41]

Finally, comparing the pooled "Koger's Island" and the pooled Florida series, we find that in three cases out of six the latter shows the highest standard deviations. The differences between constants is only great, however, in glabello-occipital length. Constants for nasal breadth are identical. In the two cases where the pooled "Koger's Island" series exceeds the Florida series the only difference of any size is in nasal index. If anything, the pooled Florida series is slightly more variable.[42]

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[40] It is possible that these differences are due mainly to the smaller number of crania in the "Koger's Island" series.

[41] It is to be remembered, however, that the higher standard deviations for the "Koger's Island" series may be due in part to much smaller series.

It may be noticed that the pooled "Koger's Island" male standard deviations for basion-nasion length, upper facial height, and nasal index are consistently high. Curves for these were constructed, but none showed any real evidence of bimodality. All are jagged, saw-toothed curves, and only in upper facial height were there two peaks. Here the major mode was at 75 mm. and the minor mode was at 71 mm. We have seen that there is a difference of 5.1 mm. between the Lu^{o} 25 K. I. (70.7 mm.) and the Lu^{v} 92 (75.8 mm.) means for this measurement, but the bimodality cannot be attributed to intersite difference because individual measurements for both sites are scattered over both modes.

The standard deviations for glabello-occipital length and maximum breadth in male and female "Koger's Island" series in no case greatly exceed those for the total U. S. A. series (all undeformed crania). In fact the standard deviation for glabello-occipital length of the "Koger's Island" males is notably low. So it would appear that the slight deformation has not materially affected the variability of these two vault measurements, although it undoubtedly has reduced the glabello-occipital length means and increased maximum breadth means in some degree.

Summing up our gleanings on variability so far, we can say that the pooled "Koger's Island" series may show a somewhat increased variability over the pooled Shell Mound and total U. S. A. series, but appears to be slightly exceeded in this respect by the pooled Florida series. A priori one would expect the possibly later inhabitants of the Southeast—as represented in the pooled "Koger's Island" and most of the pooled Florida series—to be more variable, more heterogeneous, than the earlier dolichocranic population present on at least the margins of the Southeastern area. As a guess, part of this increase in variability for the later peoples might be due to admixture with the earlier inhabitants.

COMPARISON OF THE SEPARATE AND POOLED "KOGER'S ISLAND" SERIES WITH OTHER PICKWICK BASIN SERIES

It seems obvious from the foregoing analyses that the "Koger's Island" and Shell Mound series are samples of different populations.

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[42] Hrdlička in his Anthropology of Florida (1922, pp. 90–102, 130–131) has noted that despite considerable uniformity in the Florida skeletal series there appear to be two types represented. One is a somewhat massive brachycranic type, and the other a subdolichocranic to slightly brachycranic type rather less robust than the first. George Woodbury has stated verbally that he feels there were at least two racial subtypes represented in the Florida Indian population. So the slightly higher variability of the Florida series, while by no means remarkable, may conceivably be attributable to the presence of such subtypes.

The former are essentially brachycranic, while the latter are dolichocranic. But other than in the major vault diameters and indices, how do the series differ? In short, how far-reaching are the differences as seen in metric and morphological data of the crania and postcranial skeletons?

CRANIA: METRIC CONSIDERATIONS

(See table 12)

Vault Measurements

In glabello-occipital length and maximum breadth there are significant "Koger's Island"–Shell Mound differences, which are no doubt accentuated by the slight deformation of the former. Nevertheless, even if a liberal allowance is made for this deformation, the differences are still striking. In vault length the Shell Mound male and female means exceed those of the corresponding "Koger's Island" series by over 10 mm., while in maximum breadth the "Koger's Island" means are in excess by over 9 mm.

In basion-bregma height the "Koger's Island" series show somewhat higher means, but the differences may not be significant The males show no great difference in auricular height, but the Lu^{o} 25 females, whose mean is almost certainly too high, exceeds the mean for Shell Mound females. This lack of differentiation in the vault-height diameters may indicate that a slight degree of deformation mainly influences the horizontal vault dimensions, changing the vertical dimensions but little.[43]

The "Koger's Island" males show higher means for the cranial module, but the only possibly significant differences are between the Lu^{v} 92 males (155.4 mm.) and the total Shell Mound males (152.9 mm.). The female series show no differences at all.

In minimum frontal diameter the male and female "Koger's Island" series have the greater means, but the differences are probably not significant.

In vault circumferences the main differences seem to be in the nasion-opisthion arc where the Shell Mound series show the highest means, and in the transverse arc where the "Koger's Island" series show means in excess. In horizontal circumference the male data is equivocal, while the Shell Mound females are clearly higher.

There are no really clear differences in basion-nasion and basion-prosthion lengths.

Vault Indices

In length-breadth index there are differences of over 10 index units between the "Koger's Island" and Shell Mound means. Even if the

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[43] It is possible, of course, that the vertical diameters of undeformed "Koger's Island" crania may be rather low, and that deformation raises their means to higher figures. But undeformed crania of supposedly the same Southeastern brachycranic type are notably high vaulted.

"Koger's Island" means were shaved down a few index units as a liberal allowance for deformation, the differences would probably remain significant.

In length-height index, the differences range from 5–11 index units in favor of the "Koger's Island" series. In the length-auricular height index, the unit differences of five to seven are in the same direction. It is difficult to believe that *slight* deformation alone would account for these differences, but it possibly makes a difference of several index units. All means are hypsicranic, with the means of the slightly deformed "Koger's Island" series ultrahypsicranic.

In breadth-height index the "Koger's Island"–Shell Mound differences range around five index units in favor of the latter.

The fronto-parietal index differences are smaller, varying from two to three index units in favor of the "Koger's Island" series. These differences are probably not significant.

FACIAL MEASUREMENTS

The available means for total facial height show a possibly significant excess in favor of the Lu^v 92 series, but all the series are small. This putative lengthening of the face in the brachycranic group as represented by the Lu^v 92 series is not borne out by all the means for upper facial height. The total male series show a difference of 2 mm. in favor of "Koger's Island," whereas the total female series show about the same difference in the other direction.

The means for bizygomatic breadth are somewhat greater in the separate series of "Koger's Island" type, but the pooled series show little or no difference in this respect. We doubt that the slight deformation affected the "Koger's Island" means, but that, nevertheless, remains a possibility.

In the total and midfacial angles the Lu^v 92 series are somewhat more orthognathous, but the differences do not appear significant. The male Lu^v 92 and Shell Mound series are equally prognathous according to the alveolar angle, while the corresponding female series are hyperprognathous in about the same degree.

In nasal height the "Koger's Island" males have the highest mean, with an excess over the Shell Mound males which may conceivably be significant. The differences between the female series are small. The "Koger's Island" males again show a slightly greater nasal breadth, but the "Koger's Island" females are exceeded in this respect by the Shell Mound series females.

Means for orbital height are identical, whereas the Lu^v 92 series show an insignificant excess in mean orbital breadth (taken from maxillo-frontale). This slight excess is not wholly confirmed by the orbital breadth means taken from dacryon.

In external palatal dimensions the Shell Mound series exhibit absolutely shorter and narrower palates. Correspondingly the Shell Mound series show shorter and somewhat narrower mandibles as evidenced by the means for condylo-symphyseal length and bicondylar and bigonial breadths. In the breadth diameters the Lu° 25 Shell Mound males show means nowhere near approaching those of Luᵛ 92, but it must be remembered that the lower Shell Mound means are in part due to the presence of the smaller Lu° 67 crania in the pooled series.

In symphysis height again the "Koger's Island" series show higher means which, if represented by greater series, would most certainly be significantly higher. The Luᵛ 92 series show slightly greater means for minimum breadth of the ascending ramus.

The means for the mandibular angle do not show differences in the same direction in both male and female series.

Facial Indices

In facial indices there are no unequivocal differences. In fact the "Koger's Island" series—Luᵛ 92 and Lu° 25 K. I.—show greater differences than are present between total "Koger's Island" and total Shell Mound series. This equivocality may indicate either lack of real differences between the two populations or insufficient sampling.

Comparing the pooled series, there are no real differences in the means for nasal index. In orbital indices the total Shell Mound females exhibit a higher mean relative to the Luᵛ 92 females, while the male series show substantial identity.

The Luᵛ 92 series have somewhat higher means for the external palatal index, but in view of the small numbers we hesitate to consider the differences significant ones. At least the relatively broader palate of the Luᵛ 92 series is consistent with its broader cranial and facial diameters.

In cranio-facial index the Shell Mound series show perhaps significantly higher means, but if allowance is made for deformation in the "Koger's Island" series the differences probably become not significant.

The means for zygo-gonial and fronto-gonial indices show substantial identity of the Luᵛ 92 and Shell Mound series. There appears to be no real differences in the means for the zygo-frontal index. The mandibular proportions as indicated by the mandibular indices are identical.

Additional Measurements and Indices

This analysis of possible differences in facial proportions has brought very few "Koger's Island"–Shell Mound differences to light. Either the two samples are very similar in facial proportions, or our methods of analysis are too crude to distinguish differences that might be present. Considering the latter a possible factor, we analyzed several measurements and indices, hitherto unused in this report.

There are slight interseries differences, consistent in male and female series in anterior interorbital breadth, dacryal subtense and internal orbital width, but these differences are probably not significant. There are larger and possibly more significant differences in least nasalia breadth and simotic subtense. These differences make for a consistent difference in the simotic indices, with the Lu^{v} 92 series exhibiting higher means. Thus we have some evidence of sharper angulation of the nasal bones in the Lu^{v} 92 series.

TABLE 16.—*Additional comparison of the "Koger's Island" and Shell Mound series*

Measurements (mm) and indices	Males		Females	
	Lu^{v} 92	Total Shell Mound	Lu^{v} 92	Total Shell Mound
Anterior interorbital breadth	(11) 19.5	(10) 20.4	(5) 18.3	(5) 18.8
Posterior interorbital breadth	(7) 22.4	(5) 22.5	(4) 21.4	(3) 19.7
Dacryal subtense	(7) 11.8	(4) 9.6	(40) 9.7	(3) 9.5
Least nasalia breadth	(12) 10.3	(13) 10.1	(9) 9.6	(8) 8.9
Simotic subtense	(12) 4.1	(13) 3.7	(8) 3.4	(8) 2.8
Internal orbital width	(12) 98.9	(13) 96.5	(9) 95.4	(10) 94.2
Subtense to internal orbital width	(10) 20.1	(12) 16.9	(9) 15.8	(9) 16.2
Dacryal index	(7) 52.9	(4) 40.8	(4) 45.9	(3) 48.9
Simotic index	(11) 40.5	(13) 35.9	(7) 33.7	(8) 30.2
Internal orbital width index	(10) 20.4	(12) 17.5	(9) 16.6	(12) 17.5

SUMMARY

In summary, the series of "Koger's Island" type exhibit, relative to the Shell Mound series, the following probably significant differences:

Vault dimensions:
  Small glabello-occipital length.
  Larger maximum breadth.
  Smaller nasion-opisthion.
  Larger transverse arc.
Vault indices:
  Higher length-breadth index.
  Higher length-height indices.
  (Possibly higher breadth-height index.)
Facial dimensions:
  (Possibly greater nasal height.)
  Greater external palatal diameters.
  Greater mandibular length and breadths.
  (Possibly greater symphysis height.)
Facial indices:
  (Probably higher external palatal index.)
  (Possibly high simotic index.)

CRANIA: MORPHOLOGICAL CONSIDERATIONS

The following are the principal morphological features in which the Lu^{v} 92 series differ from the total Shell Mound series:

- Muscularity:
  - The Lu^{v} 92 males and females are greater.
- Frontal region:
  - Browridges: there are more divided types in the Lu^{v} 92 males, more median types in the Lu^{v} 92 females.
  - Browridge size: larger in the Lu^{v} 92 males.
  - Glabellar prominence: greater in the Lu^{v} 92 males.
  - Postorbital constriction: greater in the Lu^{v} 92 females.
- Temporal region:
  - Temporal fullness*:[44] greater in the Lu^{v} 92 males and females.
  - Sphenoid depression: somewhat greater in the Lu^{v} 92 males and females.
  - Mastoid size: larger in the Lu^{v} 92 males.
  - Supramastoid crest: somewhat larger in Shell Mound males and females.
- Occipital region:
  - Occipital curve*: much greater in the Shell Mound males and females.
  - Inion: more often present in the Lu^{v} 92 males.
  - Shape of occipital crest: more frequently mound type in the Shell Mound males and females.
- Cranial base:
  - Pharyngeal tubercle: somewhat larger in the Lu^{v} 92 males and females.
  - Pharyngeal fossa: somewhat larger in the Lu^{v} 92 males and females.
  - Tympanic plate: somewhat thicker in the Lu^{v} 92 males.
  - Auditory meatus*: more ellipse forms in the Lu^{v} 92 males.
- Facial region (excluding the mandible):
  - Orbits shape: more rhomboid forms in the Shell Mound males and females.
  - Suborbital fossa: considerably deeper in the Lu^{v} 92 males and females.
  - Malars size: larger in the Lu^{v} 92 males and females.
  - Lateral projection of malars: somewhat greater in the Shell Mound males and females.
  - Nasion depression: somewhat greater in the Lu^{v} 92 males and possibly so in the females.
  - Nasal root breadth: somewhat greater in the Lu^{v} 92 males and females.
  - Nasal sills: more sharp forms in the Lu^{v} 92 males and females.
  - Subnasal grooves: more frequent in the Shell Mound males and females.
  - Total prognathism: somewhat greater in the Shell Mound males.
  - Midfacial prognathism: somewhat greater in the Shell Mound males.
  - Alveolar prognathism: greater in the Lu^{v} 92 males.[45]
  - Palatine torus: a greater proportion absent in the Shell Mound males and females.
- Mandible:
  - Chin form: more bilateral forms among the Shell Mound females.
  - Alveolar prognathism: somewhat greater in the Lu^{v} 92 males.
  - Genial tubercles: somewhat larger in the Shell Mound males and females.
  - Gonial angles eversion: greater in the Shell Mound males and females.

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[44] Asterisk * indicates observations influenced by deformation.

[45] This does not check well with the data for the alveolar angle, which renders the two male series equally prognathous.

Generally speaking, these observations indicate a greater ruggedness in the Lu^{v} 92 series. Notable exceptions to this generality are to be found in some of the mandibular observations.

POSTCRANIAL SKELETONS: METRIC CONSIDERATIONS

(See tables 13 and 14)

In this comparison we are utilizing the metric data from the separate "Koger's Island" and Shell Mound series, rather than lumping the respective series into "Pooled Koger's Island" and "Pooled Shell Mound" master series. This is more advantageous because differences between the separate "Koger's Island" series have already been noted. Thus our problem becomes: Are the differences between the "Koger's Island" series greater or less than they are relative to either of the Shell Mound series? Upon determining this question we will be able to give some estimate on whether the dichotomy evident in the cranial material is also present in the postcranial skeletons.

LU^{v} 92 MALES VERSUS THE SHELL MOUND MALES

To begin with, the Lu^{v} 92 males exceed both Shell Mound male series in all long-bone lengths; in maximum head diameters of the femur and humerus; and in all shaft diameters of the femur, tibia, and humerus (excepting minimum mid-shaft diameter of the humerus). In the shaft and intermembral indices there are no apparent differences except for the mid-shaft index of the femur where the Lu^{v} 92 males show consistently greater means for long-bone diameters relative to the Shell Mound male series. It is difficult to assess the significance of these differences. The differences in long-bone lengths appear to approach the level of significance most closely. For the most part the indices appear to be much the same.

LU^{o} 25 K. I. MALES VERSUS THE SHELL MOUND MALES

Now the question is, does the Lu^{o} 25 K. I. male series show this same size increase over the Shell Mound male series? Upon investigation we find that it does not. It is exceeded by both Shell Mound series in femoral lengths, but surpasses the Lu^{o} 25 S. M. series in clavicular length. The data are equivocal for the remaining length diameters. In maximum diameter of the femoral head the Lu^{o} 25 K. I. series shows a slightly higher mean, with no trend one way or the other in maximum diameter of the humeral head. The means for most shaft diameters yield no consistent differences, although Lu^{o} 25 K. I. males show a higher mean for lateral mid-shaft diameter of the femur, and stand in between the Lu^{o} 67 and Lu^{o} 25 series in respect to the antero-posterior mid-shaft diameter of the femur. None of the indices show any definite differences.

Thus the means for the Lu^{o} 25 K. I. series fail to show a trend in size increase for the "Koger's Island" males over the Shell Mound males. This situation can be interpreted in three ways: First, the Lu^{o} 25 K. I. male sample is too small to be considered representative of its parent population. This would imply that while there was a real size trend for the "Koger's Island" over the Shell Mound population, the Lu^{o} 25 K. I. male series failed to show it. Second, the Lu^{v} 92 male series may itself be a skewed sample because of the presence of several perhaps overly large crania. Third, if we consider the Lu^{v} 92 male series an adequate sample we must conclude that its parent population was rather unusual in the "Koger's Island" physical complex for its larger size. Ultimately all these interpretations boil down to the matter of sampling, and, of course, we cannot assert that any of our samples are adequate ones.

We can, however, see what the situation is in regard to the "Koger's Island" female series, and from that make a better estimate of possible differences and similarities between the "Koger's Island" and Shell Mound series as a whole.

Lu^{v} 92 Females Versus the Shell Mound Females

The Lu^{v} 92 female series shows means intermediate between those for Lu^{o} 67 and Lu^{o} 25 in femoral lengths, humeral length, and ulna length. In other long-bone lengths it neither exceeds nor is surpassed by the Shell Mound female series. In the maximum diameter of the humeral head the Lu^{v} 92 females are again intermediate. In shaft diameters of the femur they exceed only in the antero-posterior subtrochanteric diameter, but show means in excess for all the tibial shaft diameters and in minimum mid-shaft diameter of the humerus. Indicially, the Lu^{v} 92 females show no differences relative to the Shell Mound series, other than exceeding the Lu^{o} 67 series in the mid-shaft index of the humerus. So if there is any trend in size increase to be seen in the Lu^{v} 92 female series over the Shell Mound series, it is a pretty spotty trend and is only clear in the shaft diameters of the tibia.

Lu^{o} 25 K. I. Females Versus the Shell Mound Females

In long-bone lengths this very small series exceeds the Shell Mound females in tibial and clavicular lengths, and stands in between Lu^{o} 67 and Lu^{o} 25 in humeral length. It is also intermediate in maximum head diameter of the humerus. In shaft diameters the Lu^{o} 25 K. I. females show means in excess for antero-posterior mid-shaft diameters of the femur and tibia, antero-posterior diameter at the level of the nutrient foramen of the tibia, and minimum mid-shaft diameter of the humerus. They are intermediate in respect to the antero-posterior subtrochanteric diameter of the humerus, and are surpassed by both Shell Mound series in lateral mid-shaft diameter of the femur. Indicially, they show only a small excess over the Shell Mound series in the radio-humeral index.

In short, they, along with the Lu° 25 K. I. males, show no consistent size increase, and in fact exhibit in some cases smaller diameters as compared with Shell Mound series.

STATURE RECONSTRUCTIONS

Again we have taken recourse to Pearson's formula *e* for reconstruction of stature from the long bones. The results, which should be taken none too seriously, are presented below.

TABLE 17.—*Stature reconstructions for "Koger's Island" and Shell Mound series*

Series	MALES	
	Right femur and tibia	Left femur and tibia
	Mm.	*Mm.*
Lu^{v} 92	(18) 167.18	(16) 167.36
Lu° 25 K. I.	(3) 164.34	(2) 163.64
Lu° 67	(7) 164.67	(7) 164.98
Lu° 25 S. M.	(12) 165.16	(6) 166.62
	FEMALES	
Lu^{v} 92	(9) 152.94	(7) 153.12
Lu° 25 K. I.	(2) 155.97	(4) 157.87
Lu° 67	(4) 152.00	(4) 151.97
Lu° 25 S. M.	(4) 154.53	(4) 154.50

The numbers represented are, of course, pitifully small, and add an extra hazard to the uncertainties of the reconstruction formula as applied to nonwhites. If anything can be adduced from the figures, it is the slightly greater stature indicated for the Lu^{v} 92 males. This very inconsiderable excess is not confirmed by the Lu^{v} 92 female mean.

SUMMARY

To what conclusions has all this led us? If anything, the Lu^{v} 92 male and female series show a rather dubious size increase over the corresponding Shell Mound series. This putative increase probably attains significance in a few shaft diameters for the Lu^{v} 92 males, although the stature reconstruction data does not support this. If, then, the trend in size increase is dubious for the Lu^{v} 92 series, it can be said to be nonexistent for the Lu° 25 K. I. male and female series. Actually the "Koger's Island" series as a whole differ about as much between each other as they differ from the Shell Mound series. So the metric data derived from the postcranial skeletons do not show any appreciable differences between "Koger's Island" and Shell Mound series. Possibly larger samples would show that the indications of greater size and ruggedness for the Lu^v 92 males carry through for the "Koger's Island" population as a whole. Other than this possibility our negative conclusions as outlined above must stand.

POSTCRANIAL SKELETONS: MORPHOLOGICAL CONSIDERATIONS

Due to time considerations, observations on the femora and tibiae of the Lu^o 25 K. I. series were omitted. The following morphological features of the postcranial skeleton appear to show "Koger's Island"–Shell Mound differences:

- Femur:
  - Poiret's (squatting) facet: present in a greater proportion in the Lu^o 67 series relative to Lu^v 92. This is a purely functional feature dependent upon habitual squatting.
  - Bowing: possibly more pronounced in the Lu^o 67 series as contrasted to the Lu^v 92 series.
  - Pilaster: somewhat more frequently absent in the Lu^v 92 series.
- Tibia:
  - Shaft shape: more type 4 (quadrilateral) in the Lu^o 67 series; more type 3 (lateral surface concave) in the Lu^v 92 series.
  - Squatting facets: more frequently present in the Lu^o 67 series.
- Clavicle:
  - Curvature: the Lu^v 92 series show more pronounced cases of curvature than all the others, Lu^o 25 K. I. series included.
  - Shape of distal extremity: the Lu^v 92 series show more cases of quadrangular shape than do any of the others, Lu^o 25 K. I. included.
- Sacrum:
  - Form: the Lu^v 92 series show higher proportions of hyperbasal forms and in this respect differ from all the other series, Lu^o 25 K. I. included.
  - Closure: the Lu^v 92 series and the Lu^o 25 K. I. females have a higher proportion of closure in the 3rd segment from the top.
  - Simian notch: fewer cases in the Lu^v 92 series and the Lu^o 25 K. I. males.

These are the most definite differences to be found between the two physical complexes. Possibly none of them are great enough to mean much at all. It is to be noted that the Lu^o 25 K. I. series shows no greater or less resemblance in morphological features of the postcranial skeleton to the Lu^v 92 series than to the Shell Mound series.

SUMMARY

Craniologically speaking, there are a number of differences between "Koger's Island" and the Shell Mound series, to be found particularly in horizontal vault diameters; facial, palatal, and mandibular breadths; and in various observations denoting greater ruggedness on the part of the "Koger's Island" series. Other than in indices pertaining to the vault, the external palate, and nasal angulation, the two groups of series seem to be reasonably similar.

Metric data on the postcranial skeleton indicate, if anything, a slight size increase, perhaps significant in only a few measurements, of the series from Koger's Island proper (Lu^v 92) over the Shell Mound series. In this putative size increase the intrusive Lu° 25 skeletons of "Koger's Island" physical type do not appear to join.

Morphological data on the postcranial skeleton yield few differentiating features, but a large number of the points observed on the postcranial skeleton are highly subject to functional changes anyway. The higher percentage of squatting facets in the Shell Mound series may indicate more habitual squatting among that group. The other differences may all be due to sampling error.

What then does all this add up to? It is evident so far that the "Koger's Island" people are different culturally from the Shell Mound people, and that, if our samples are at all adequate, there are accompanying physical differences. These physical differences are most clearly apparent in the crania, with very few real differences in the postcranial skeletons.

In the Shell Mound series we are dealing with an earlier dolichocranic group in which there may be a smaller-sized variant (Lu° 67). In the "Koger's Island" series we have a stratigraphically more recent brachycranic group which appears somewhat more rugged than its predecessor. We have already tentatively established the affinities of the earlier dolichocranic group, and it remains for us to place the later brachycranic series in their proper ethnic position in the area.

COMPARISON OF THE SEPARATE AND POOLED "KOGER'S ISLAND" SERIES WITH OTHER SOUTHEASTERN SERIES

CRANIAL DATA

"KOGER'S ISLAND" SERIES VERSUS TENNESSEE STONE GRAVE SERIES

A comparison of the major vault measurements and indices is not likely to be productive since we have no figures other than height measurements for Fuller's series (Fuller, 1914),[46] and since Hrdlička's series (1922, pp. 111–112), while undeformed, consists of crania with length-breadth indices of 80 and over. The vault-height measurements, nevertheless, are very similar indeed. The lower cranial modules of Hrdlička's series may conceivably be attributed to selection of brachycranic skulls. Otherwise there may be a significant difference between the male series.[47]

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[46] Fuller himself does not give means for most vault measurements and indices and we were unable to re-sort his series to obtain undeformed or slightly deformed means.

[47] Cranial capacity and vault thickness remaining the same, it is conceivable that rounder crania might have slightly lessened cranial modules if the sphere analogy is at all applicable to human crania.

TABLE 18.—*Cranial measurements and indices of Southeastern brachycranic series* [1]

Measurements (mm.) and indices	Males					
	"Koger's Island"	Tennessee Stone Graves (Hrdlička)*	Tennessee Stone Graves (Fuller)	Pooled Florida (Hrdlička)	Boyott's Field Arkansas (Hrdlička)	Louisiana (Hrdlička)
Glabello occipital length	**174.0 (20)	167.0 (21)		179.7 (110)		
Maximum breadth	**145.4 (20)	146.0 (21)		145.3 (110)		
Basion-bregma height	**143.4 (17)	142.0 (14)	**144.0 (34)	141.7 (76)		
Cranial module	155.0 (23)	151.7		155.2 (76)	153.7 (10)	155.3 (12)
Auricular height	122.3 (10)		**123.3 (55)			
Minimum frontal depth	95.7 (36)		93+ (123)		96 (13)	96 (17)
Horizontal circumference	**507.2 (16)		512+		500 (13)	
Nasion-opisthion arc	**359.2 (8)		359		352 (10)	
Transverse arc	**326.6 (8)		310			
Basion-nasion length	104.5 (23)		102.1 (78)		104 (10)	106 (7)
Basion-prosthion length	98.8 (18)		98.7 (73)		102 (10)	105 (7)
Length-breadth index	**83.6 (18)	87.2		80.8 (110)		
Length-height index	**82.8 (16)	85.0		79.0 (76)		
Breadth-height index	**97.9 (16)	97.6		98.3 (76)		
Total face height	125.5 (8)	121.0	121.5 (82)	124.0 (19)	117.5 (9)	123.5 (7)
Upper face height	73.1 (22)	74.0	71.1 (90)	74.7 (54)	70.5 (11)	75.5 (10)
Bizygomatic breadth	142.4 (19)	139.0	139.7 (74)	141.4 (54)	138.5 (8)	142 (9)
Total face angle	85.3 (9)		86.5 (92)			
Nasal height	52.7 (26)	52.0	52.9 (104)	52.7 (65)	49.8 (11)	51.6 (13)
Nasal breadth	25.8 (22)	26.0	26.0 (102)	24.9 (63)	25.4 (11)	26.2 (13)
Orbital height	35.4 (14)		34.3 (94)			
Orbital breadth (dacryal)	41.0 (7)		39.6 (93)			
External palatal length	54.7 (14)		56.2 (86)		55.7 (12)	57.5 (10)
External palatal breadth	69.1 (12)		68.8 (86)		65.6 (12)	66.5 (10)
Bigonial breadth	107.6 (18)			107.5 (22)	105 (9)	107 (11)
Symphysis height	36.9 (17)			36.9 (29)	36.5 (10)	37.5 (11)
Minimum breadth of ascending ramus	35.1 (25)			37.8 (29)		
Mandibular angle	114.8° (20)				120° (10)	118° (13)
Total face index	88.5 (7)	86.0	86.0 (81)	88.5 (16)	85 (7)	86 (6)
Upper face index	52.2 (14)	53.7	53.2 (98)	52.5 (45)	51 (8)	53 (8)
Nasal index	48.9 (23)	50.0	50.1 (101)	47.4 (63)	51.1 (11)	51.0 (13)
Orbital index (dacryal)	86.14 (7)		87.5 (90)			
External palatal index	126.1 (12)		122.6 (82)		118 (12)	116 (10)

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[1] An asterisk * indicates undeformed crania with length-breadth indices of 80 and over; two asterisks ** indicate measurements and indices affected by deformation; underscored figures indicate where total "Koger's Island" series is used. Otherwise Lu^{v} 92 means are used.

TABLE 19.—*Cranial measurements and indices of Southeastern brachycranic series* [1]

Measurements (mm.) and indices	Females					
	"Koger's Island"	Tennessee Stone Graves (Hrdlička)*	Tennessee Stone Graves (Fuller)	Pooled Florida (Hrdlička)	Boyott's Field Arkansas (Hrdlička)	Louisiana (Hrdlička)
Glabello occipital length	**164.1(22)	161 (17)		171. (50)		
Maximum breadth	**139.8(22)	140 (17)		139. (50)		
Basion-bregma height	**137.9(15)	139	**139.+(26)	135.5(34)		
Cranial module	**147.8(20)	146.7		149.3(34)	148.4(6)	149.0(17)
Auricular height	**120.3(7)		**120.6(56)			
Minimum frontal depth	91.1(27)		90.0(54)		93 (10)	94 (17)
Thickness left parietal	5.6(13)				5.3(9)	4.8(18)
Horizontal circumference	**482.9(16)		**481		**485 (10)	**488 (18)
Nasion-opisthion arc	**352.0(3)		**349		**342 (7)	
Transverse arc	**316.8(6)		**302			
Basion-nasion length	98.5(22)		96.5(55)		98 (4)	98 (6)
Basion-prosthion length	95.5(16)		94.4(54)			97 (6)
Length-breadth index	**85.6(19)	86.4		81.5(50)		
Length-height index	**84.4(14)	89.2		78.6(34)		
Breadth-height index	**98.1(15)	92.4		94.8(34)		
Total face height	114.8(8)	112	112.0(50)	114.0(6)		
Upper face height	67.4(16)	68	68.4(61)	70.0(15)		
Bizygomatic breadth	131.5(15)	128	128.4(48)	133.4(12)		
Total face angle	83.0(9)		85.2(66)			
Nasal height	48.3(22)	48	48.0(77)	50.6(18)	47.0(4)	48.7(15)
Nasal breadth	23.9(15)	25	24.8(70)	24 (15)	25.7(4)	25.6(15)
Orbital height	34.0(9)		33.3(64)			
Orbital breadth (dacryal)	40.4(5)		37.7(70)			
External palatal length	53.7(7)		52.4(59)		56.5(2)	53.5(9)
External palatal breadth	65.4(7)		63.4(55)		64.5(2)	65.0(9)
Bigonial breadth	98.5(15)			97 (17)		
Symphysis height	35.1(9)			33.8(21)		
Minimum breadth of ascending ramus	32.9(16)			34.4(21)		
Total face index	86.3(6)	87.5	85.2(51)	87.0(5)		
Upper face index	51.7(11)	53	53.2(63)	52.4(9)		
Nasal index	50.3(14)	51.3	51.5(70)	47.5(15)	54.8(4)	52.6(15)
Orbital index (dacryal)	81.9(5)		85.9(69)			
External palatal index	122.0(7)		120.9(55)		115.0(2)	122.0(9)

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[1] An asterisk * indicates undeformed crania with length-breadth indices of 80 and over; two asterisks ** indicate measurements and indices affected by deformation; underscored figures indicate where total "Koger's Island" series is used. Otherwise Lu^{v} 92 means are used.

In minimum frontal diameter the "Koger's Island" series exceed Fuller's series by a probably insignificant margin. The Tennessee series are smaller, although probably not significantly so, in basion-nasion and basion-prosthion lengths.

The means Fuller gives for vault circumferences are of uncertain value, but check quite well with the Koger's Island series except for the transverse arc where there is surely a difference in technique.

Total facial heights are somewhat greater in the "Koger's Island" series, but since the upper facial heights of all series are very similar this difference may be due to sampling error in our series. Throughout the male and female series the "Koger's Island" group shows a greater mean bizygomatic diameter, exceeding the Tennessee series by around 3 mm. This may constitute a barely significant difference. The total facial and upper facial indices are very similar, although the mean for the latter is somewhat lower in the"Koger's Island" series. All are, respectively, mesoprosopic and mesene.

In nasal diameters the series are practically identical, except for the lower nasal breadth of the "Koger's Island" females. The mean nasal indices of the "Koger's Island" series are a little lower, falling in the mesorrhine category along with the Tennessee stone-grave males. The Tennessee females are barely chamaerrhinic.

Orbital dimensions are smaller in Fuller's series, but indicially all but the Lu^v 92 females fall in the mesoconch category. The Lu^v 92 females are chamaeconch, but the series is very small.

In external palatal breadth the Lu^v 92 series have somewhat greater means which render their external palatal indices more brachyuranic. Differences of this degree are probably not significant.

While the "Koger's Island" and Tennessee series are not identical they are surely similar enough to have been drawn from the same general population. None of the differences appear to be great. It is true that the "Koger's Island" series have somewhat greater minimum frontal, bizygomatic, orbital, and palatal breadths, as well as slightly lower upper facial, nasal, and orbital indices. Possibly only the difference in bizygomatic breadth is significant.[48]

It may seem remarkable that in view of the apparent heterogeneity of Fuller's series, they are so similar to the "Koger's Island" series in most metric features. In his series Fuller noted dolichocranic skulls bearing "striking superficial resemblances to plains crania," while others he states "might almost be Algonkin or Iroquois." He is further convinced of a "close general affiliation" between his deformed and undeformed brachycranic skulls and the Arkansas and Louisiana crania described by Hrdlička (Fuller, 1914, pp. 130–133). Whether or not there were cultural differences between the graves of the dolicho- and brachycranic types, the series is obviously a mixed one. The brachycranic element would probably be more similar to the "Koger's Island" series than Fuller's data indicates.

"KOGER'S ISLAND" SERIES VERSUS FLORIDA SERIES

The Florida series have longer and somewhat lower vaults than the "Koger's Island" series (Hrdlička, 1922, pp. 94, 103, 106). Maximum breadths are virtually identical. Means for the cranial module are the same in the males, but in females the Florida series has a somewhat higher mean.

In length-breadth and length-height indices the Florida series are less brachycranic and hypsicranic, but the differences are at least partly due to the deformation of the "Koger's Island" crania. The breadth-height indices of the males are the same, whereas the Florida female mean is lower and falls in the metriocranic category.

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[48] A perusal of Fuller's morphological observations in search for other differences only led us to realize that Fuller's subjective standards differed from ours.

In total facial height the Lu^v 92 means are rather greater, but the addition of shorter-faced crania from Lu° 25 K. I. to the total series makes the reverse hold true in upper facial height. The differences in bizygomatic breadth are small. Total and upper facial indices are virtually identical in the Florida and Alabama series.

Nasal dimensions are practically identical, except for slightly lower mean nasal breadth in the Florida males. The Florida series have lower nasal indices which almost fall in the leptorrhine category. If the series were greater in number the female differences in this respect might be significant.

The means for bigonial breadth and symphysis height are identical in the male series, while in the females the Florida series shows lower means. The Florida series exhibit a considerably greater minimum breadth of the ascending ramus. This difference is almost surely significant.

In short there are very few real differences between the Florida and "Koger's Island" series as far as can be ascertained from the present data. It is true that the "Koger's Island" series is more brachy- and hypsicranic, but we do not know how much of this is due to deformation. Facial and nasal dimensions are much the same, and indicially there are only slight differences. Only the broader ramus of the Florida series differentiates the two groups.

"KOGER'S ISLAND" VERSUS ARKANSAS AND LOUISIANA SERIES

A detailed summary of the similarities and differences between these series is not worth while because of the small size of the Arkansas and Louisiana series (Hrdlička, 1909, pp. 175–240) in a number of pertinent measurements and indices.

Suffice it to say that the series appear quite similar except for the following: Greater minimum frontal diameters in the Arkansas and Louisiana females; slightly thicker parietals in the "Koger's Island" series; and somewhat lower total facial and palatal indices and higher nasal indices in the Arkansas and Louisiana series. The significance of these differences is hard to estimate because of series size. Most assuredly all these series fit in the general Southeastern brachycranic group. Beyond this we hesitate to venture.

POSTCRANIAL DATA

MEASUREMENTS AND INDICES

In long-bone lengths there are no consistent differences between the Alabama, Florida, Arkansas, and Louisiana series if both male and female measurements are used in the comparison. If there are any real differences the series are too small to show them.

All the shaft diameters are very similar indeed, with the Florida and Lu^{v} 92 series exceeding the others where there are any appreciable differences. None of these differences appear to be significant.

Indicially, there is only one difference: The Arkansas and Louisiana series show lower platymeric indices than the Alabama series. Other than this, the series appear very similar.

In short, the shaft diameters and indices of the various series are very much alike, and the long-bone lengths show no consistent differences or similarities. It is apparent that while the shaft diameters in a good number of cases are quite well represented in numbers, the shaft lengths are not. If, then, we had adequate series for these long-bone lengths, differences and similarities between the series would be more obvious.

TABLE 20.—*Postcranial measurements and indices of Southeastern brachycranic series*

Measurements (mm.) and indices	Males									
	Lu^{o} 25 K. I.		Lu^{v} 92		Florida		Boyott's Field, Arkansas		Louisiana	
	R	L	R	L	R	L	R	L	R	L
Femur:										
Bicondylar length	(8) 433.5	(6) 430.8	(27) 449.0	(27) 449.0	(8) 443	(12) 441	(14) 456	(14) 456	(19) 441	(19) 442
Antero-posterior subtrochanteric diameter	(10) 25.2	(10) 26.5	(32) 26.8	(29) 27.5	-------	-------	(15) 25	(15) 25	(23) 24	(23) 24
Lateral subtrochanteric diameter	(10) 31.8	(10) 31.0	(31) 33.3	(31) 32.0	-------	-------	(15) 32	(15) 32	(23) 33	(23) 33
Antero-posterior mid-shaft diameter	(10) 28.8	(8) 28.9	(31) 31.1	(32) 32.1	(42) 31.1	(44) 30.8	-------	-------	-------	-------
Lateral mid-shaft diameter	(9) 25.7	(9) 25.8	(32) 28.1	(31) 27.4	(42) 27.2	(44) 27.2	-------	-------	-------	-------
Platymeric index	(10) 81.0	(10) 87.2	(31) 90.6	(29) 85.2	-------	-------	(15) 76.7	(15) 76.6	(23) 74.2	(23) 74.6
Mid-shaft index	(9) 85.5	(9) 90.7	(31) 90.5	(31) 90.6	(42) 87.5	(44) 88.3	-------	-------	-------	-------
Tibia:										
Maximum length	(7) 361.4	(4) 376.0	(18) 377.2	(19) 375.4	(5) 351.4	(7) 369.6	(7) 385	(7) 383	(13) 371	(13) 370.8
Antero-posterior mid-shaft diameter	(10) 32.6	(5) 33.8	(31) 34.3	(29) 33.9	(25) 33.5	(31) 33.9	(9) 34.5	(9) 35	(17) 33	(17) 33
Lateral mid-shaft diameter	(9) 21.1	(6) 20.5	(30) 21.9	(30) 21.6	(25) 22.6	(31) 22.3	(9) 22	(9) 22	(17) 22	(17) 22
Mid-shaft index	(10) 65.1	(6) 61.2	(30) 62.1	(29) 64.9	(25) 67.4	(31) 65.7	(8) 63.7	(8) 63.6	(17) 68.4	(17) 68.5
Humerus:										
Maximum length	(5) 322.5	(5) 318.9	(31) 326.8	(19) 320.9	(13) 327.2	(5) 315.2	(9) 327	(9) 326	(19) 327	(19) 327
Maximum mid-shaft diameter	(9) 24.1	(10) 22.2	(36) 24.0	(25) 22.6	(20) 24.7	(20) 23.5	(10) 23	(10) 22	(18) 23	(18) 22
Minimum mid-shaft diameter	(9) 17.6	(10) 16.7	(37) 17.7	(24) 17.0	(20) 18.6	(20) 18.3	(10) 17.0	(10) 16.7	(18) 17.6	(18) 17.4
Mid-shaft index	-------	-------	(33) 74.6	(24) 74.9	(20) 75.1	(20) 77.9	(10) 74.4	(10) 75.4	(18) 76.8	(18) 77.8
Radius:										
Maximum length	(8) 249.7	(4) 240.5	(21) 253.9	(16) 255.4	-------	-------	(3) 250	(3) 247	(10) 253	(10) 251
Ulna:										
Maximum length	(4) 265.5	(6) 260.5	(16) 272.6	(14) 273.4	-------	-------	(5) 273	(7) -------	(7) 269	(7) 266
Tibio-femoral index	(3) 83.5	(2) 82.0	(17) 83.3	(16) 82.6	-------	-------	(5) 82.1	(5) 82.6	(9) 84.2	(9) 84.3
Radio-humeral index	(4) 77.2	(4) 77.8	(17) 78.4	(7) 79.0	-------	-------	(3) 75.6	(3) 75.0	(9) 77.8	(9) 77.6

TABLE 21.—*Postcranial measurements and indices of Southeastern brachycranic series*

Measurements (mm.) and indices	Females									
	Lu° 25 K. I.		Lu^v 92		Florida		Boyott's Field Arkansas		Louisiana	
	R	L	R	L	R	L	R	L	R	L
Fermur:										
Bicondylar length	(6) 413.8	(7) 419.4	(17) 407.1	(15) 407.5	(4) 413	(4) 406	(4) 410	(4) 412	(12) 412.5	(12) 413
Antero-posterior subtrochanteric diameter	(6) 22.5	(8) 22.6	(15) 24.2	(17) 23.9	-------	-------	(7) 22	(7) 22	(13) 22	(13) 22
Lateral subtrochanteric diameter	(7) 28.9	(8) 27.5	(19) 29.3	(17) 28.5	-------	-------	(6) 32	(6) 32	(13) 30.5	(13) 30.5
Antero-posterior mid-shaft diameter	(10) 32.6	(5) 34.4	(19) 25.8	(17) 25.1	(19) 26.5	(17) 25.7	-------	-------	-------	-------
Lateral mid-shaft diameter	(9) 21.1	(6) 20.5	(18) 23.8	(17) 24.3	(19) 23.2	(17) 24.0	-------	-------	-------	-------
Platymeric index	(7) 76.6	(8) 82.5	(15) 83.3	(17) 81.3	-------	-------	(6) 69.5	(6) 70.2	(13) 72.9	(13) 72.2
Mid-shaft index	(7) 89.9	(8) 93.5	(20) 93.8	(19) 97.5	(19) 87.7	(17) 93.3	-------	-------	-------	-------
Tibia:										
Maximum length	(3) 353.2	(4) 360.5	(10) 336.0	(10) 337.2	(5) 336	(5) 339.2	(2) 331.5	(2) 331.5	(10) 348	(10) 347
Antero-posterior mid-shaft diameter	(4) 27.5	(5) 28.8	(16) 28.8	(18) 28.4	(22) 27.3	(33) 28.1	(4) 28	(4) 28	(9) 29	(9) 29
Lateral mid-shaft diameter	(5) 18.6	(5) 18.4	(16) 19.4	(18) 18.8	(22) 19.2	(33) 19.2	(4) 19.5	(4) 20	(9) 19	(9) 18.5
Mid-shaft index	(4) 65.3	(5) 67.7	(15) 68.6	(16) 68.1	(22) 65.7	(33) 68.4	(4) 68.7	(4) 69.8	(9) 64.5	(9) 63.9
Humerus:										
Maximum length	(5) 302.1	(4) 301.5	(14) 300.9	(13) 300.5	(5) 293.2	(5) 294.7	(2) 289	(2) 289	(13) 302	(13) 298
Maximum mid-shaft diameter	(6) 20.8	(7) 19.9	(17) 20.8	(15) 20.3	(22) 21.1	(23) 20.9	(5) 20.5	(5) 20	(13) 20.5	(13) 20
Minimum mid-shaft diameter	(6) 15.3	(7) 14.7	(16) 15.4	(16) 15.4	(22) 14.9	(23) 15.6	(5) 14	(5) 14	(13) 15	(13) 15
Midshaft index	-------	-------	(13) 74.1	(15) 75.8	(22) 70.9	(23) 74.6	(5) 69.8	(5) 70.3	(13) 73.1	(13) 73.9
Radius:										
Maximum length	(2) 230.0	(3) 221.8	(16) 228.2	(11) 228.9	-------	-------	-------	-------	(14) 227	(14) 226
Ulna:										
Maximum length	(5) 248.9	(5) 249.5	(11) 245.1	(11) 244.3	-------	-------	(2) 241	-------	(9) 244	(9) 243
Tibio-femoral index	(2) 83.5	(4) 83.0	(9) 82.3	(7) 83.3	-------	-------	(2) 82.7		(6) 84.3	
Radio-humeral index	(2) 77.0	(3) 77.7	(11) 74.7	(9) 76.4	-------	-------	-------	-------	(6) 76.2	(6) 77.4

DISCUSSION OF STATURE ESTIMATES

Hrdlička's estimates of stature for his Florida series are between 165 and 168 cm. for males, and 152 to 154 cm. for females (Hrdlička, 1922, p. 118). Fuller, employing Manouvrier's formula, states the reconstructed stature of four of his males to average 167.0 cm. and of the females (four in number) 156.0 cm. (Fuller, 1914, p. 80). Our Koger's Island figures, using Pearson's formula *e*, are about 167 cm. for 17 Lu^v 92 males and about 153 cm. for 8 Lu^v 92 females. These estimates check quite closely, except for Fuller's female estimate which is probably too high.

Statures of living Southeastern tribes, given by Boas (1895, pp. 368–369, 374–375), Collins (1938, p. 354), and Krogman (1935, p. 74) are interesting but not particularly important in this connection. They are as follows:

TABLE 22.—*Statures of living Southeastern Indians*

Group	Males	Females
	Cm.	*Cm.*
Cherokee (eastern) (Boas)	(104) 167.7	(?) 154.9
Chickasaw (Boas)	(59) 167.9	(?) 155.9
Choctaw (Boas)	(260) 170.0	(?) 157.2
Choctaw (Collins)	(84) 170.8	(46) 155.4
Creek (Boas)	(53) 173.5	------------
Seminole (Oklahoma) (Krogman)	(59) 169.6	(49) 156.7

Naturally, we intend to make no identification between the skeletal and living groups, nor can we explain the differences between the living groups unless we simply say that those with greater stature were perhaps more mixed. We merely wish to show that if the Cherokee and Chickasaw means have any real validity, the above stature estimates based on long bones are not improbable.

GENERAL CHARACTERISTICS OF THE SOUTHEASTERN BRACHYCRANIC TYPE

Speaking in general terms, this type is brachycranic, hypsicranic, and high metrio- to low acroncranic. The forehead is probably medium relative to vault breadth (metriometopic), and in males narrow and in females more medium in relation to facial width. Facial width relative to vault breadth is probably medium or a little below.

The type for the most part lacks any real degree of facial pronathism and is thus barely orthognathous, but the amount of alveolar prognathism appears to be rather high (alveolar angle: Lu^{v} 92 males, 70.2°; females, 65.0°). The face is medium in its proportions (mesoprosopic and mesene). In nasal proportions there is more variation: All the male series and the "Koger's Island" and Florida females have means within the mesorrhinic range, whereas the means of Tennessee, Arkansas, and Louisiana females fall in the chamaerrhinic division. The external palate is relatively broad (brachyuranic).

Stature appears to be around 167 cm. for males and 153–154 cm. for females, which would make the group around average stature for American Indians.

SUMMARY

As far as can be determined from the above data, the Pickwick Basin "Koger's Island" crania are associated most closely with other cranial series from Tennessee, Arkansas, Louisiana, and Florida. Cranial deformation, both occipital and fronto-occipital, is a feature of all these groups. All these fall within the Southeastern brachycranic group whose limits in the North and Northwest according to Hrdlička

(1922, p. 113) are in Tennessee and Arkansas.[49] Hrdlička hastens to point out that "in all these regions there was a sprinkling also of a high vaulted mesocephalic type of population. This population is plainly not a mere variant of the more round-headed types, and connects with the North (Hrdlička, 1922, p. 113)." This mesocranic type, resulting from mixing of northeastern dolichocranic and Southeastern brachycranic strains, reached as far south as Florida and as far southwest as Arkansas and Louisiana (Hrdlička, 1922, pp. 113–114). Of the living tribes, Hrdlička states that the Seminoles, Creeks, Chickasaws, and others were more of this mesocephalic type, while the Choctaws, Natchez, Alabamas, and related tribes were closer to the Southeastern brachycephalic type.

The mesocranic indices of most of the series from the east-central area may very conceivably indicate dolichocranic-brachycranic admixture there. The Madisonville site in extreme southwestern Ohio, according to Hooton (1920, pp. 133–134), was "inhabited with little doubt by a people in whom a preponderance of physical characters belonging to the southern and eastern brachycephalic group of Indians was united with an admixture of modified characters originating in the eastern dolichocephalic group. This Madisonville group seems to have been the result of long contact rather than primary mixture." If the hypothesis that the eastern mesocranic groups are the result of mixture is correct, and we have no reason to doubt it, the task of isolating subtypes of other than composite status within the Southeastern brachycranic group would be difficult if not impossible with our present data.

Hrdlička states that a few crania from Georgia and South Carolina appear to be of this Southeastern brachycranic type (Hrdlička, 1922, p. 110). We have observed some of the crania from Moundville, Ala., and one of us (Snow) has measured several of them. On the basis of casual observation they seem to be of this type as well. As far as can be ascertained from the data presented by Funkhouser (*in* Webb, 1938, pp. 225–251; see also Webb, 1939, pp. 109–125), the Norris and Wheeler Basin skeletons, excepting those from site No. 20 of Norris Basin, are fundamentally of the same deformed brachycranic type.

Finally, it should be reiterated that the archeologically documented Pickwick Basin skeletal material conclusively demonstrates the superposition of a population of Southeastern brachycranic type upon a dolichocranic population affiliated with the eastern long-heads. Dolichocephalic people probably were earlier in most parts of the Southeast; they *certainly* were earlier in Pickwick Basin.

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[49] Hrdlička adds, ". . . unless it survives, as seems probable in some living offshoots such as a part of the Osage and the Winnebago."

MISCELLANEOUS PROBLEMS

THE LU° 59 CRANIA

The shell mound near Bluff Creek (site Lu° 59) presents a very interesting situation from the physical standpoint. Here shell-tempered pottery extends down 2 feet from the top of the mound, and fiber-tempered pottery reaches down to 5½ or 6 feet. There are 10 crania available, excluding a definitely intrusive burial (site Lu° 59–11) associated with artifacts of "Koger's Island" culture. The skull of this burial is unmistakably of the "Koger's Island" physical type.[50]

These 10 crania are from burials ranging in depth from 2 to 6 feet, but since most of them were probably laid in shallow graves, the actual occupational levels with which they were associated would be somewhat higher. The very nature of the shell mounds themselves make it ordinarily impossible to delineate burial-pit outlines. Aboriginal disturbances further complicate the situation. Of the five types of burials, type 5 (sitting burial) undoubtedly requires the deepest pit, and it is to be noted that depth measurements for this type are taken from the bottom of the pit.[51] Type 1 (round grave) burials rest in pits around 1 foot deep. Probably types 2 and 3 (partially flexed and extended burials, respectively) were the most superficial interments. We shall return to the matter of burial type and burial depth later.

Because of the possibility of a change in physical type in this site, we have endeavored to assign each of the 10 crania to one or other of the two principal groups of the area, i. e., the Shell Mound and "Koger's Island" types. The typing of five of these crania was done by one of us (Snow) on relatively intact but not completely restored material. The remaining five were typed by comparing individual cranial measurements and indices with ranges for the total Shell Mound and "Koger's Island" series. The metric determinations derived from this comparison were checked against the morphological observations.

The following are the putative Shell Mound type crania:

No. 14 (*skull only*).—Five feet below 65L4, undeformed. The minimum frontal diameter and length-breadth index (75.58) are below the "Koger's Island" range, while the external palatal breadth is at the bottom of the range. The cranio-facial and zygo-frontal indices are below the Shell Mound ranges, while the fronto-gonial index is above the range. Morphologically, however, the skull appears to be a Shell Mound type.

No. 43 [52].—Five feet two inches below 85R3, type-1b burial, and hence 1 foot is deducted to make the real level around 4 feet. In auricular height, minimum frontal diameter, length-breadth index (75.42), length-auricular height index, bigonial breadth, and minimum breadth of the ascending ramus, the skull falls below the "Koger's Island" ranges. Maximum breadth, bizygomatic breadth, and nasal height are at the bottom of these ranges. Only the total facial index is outside the Shell Mound range. Morphologically, the skull is of the Shell Mound type.

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[50] The cranial measurements and indices of the skull were used in the total "Koger's Island" male series.

[51] On the average these pits are 2 to 2½ feet deep.

[52] This burial is associated with Nos. 49 and 50. No. 49 has in association a fiber-tempered pot, probably representative of the oldest pottery in the mound.

No. 49.[53]—Five feet two inches below 85R4, type-1b burial, and hence 1 foot is deducted to make the real level around 4 feet. This skull is considered a Shell Mound type by Snow.

No. 75.[54]—Six feet below 85R4, type-5a burial, and hence 2–2.5 feet are deducted to make the real level from 3.5–4 feet. This skull is considered a Shell-Mound type by Snow.

No. 107.—Five feet six inches below 135R4, type-5a burial, and hence 2–2.5 feet are deducted to make the real level from 3–3.5 feet. This skull is considered a Shell Mound type by Snow.

The following are the putative "Koger's Island" type crania:

No. 2[55] *(skull only).*—Two feet below 85L3. The following measurements and indices fall outside the Shell Mound ranges: Glabello-occipital length, length-breadth index (86.71, undeformed), and the length-height indices. The bicondylar and bigonial breadths fall below the "Koger's Island" ranges. The morphological data are equivocal.

No. 15.—Four feet below 65R4, type 2b, and hence grave was probably superficial. The maximum breadth, length-breadth index (85.50, undeformed), and the length-auricular height index are greater than the tops of the Shell Mound ranges. None of the few available measurements and indices fall outside the "Koger's Island" ranges. Morphologically the skulls appear to be of "Koger's Island" type.

No. 18.—Two feet five inches below 100R3, type 1b, and hence 1 foot is deducted to make the real level around 1.5 feet. This skull is considered a "Koger's Island" type by Snow.

No. 34 (skull only).—Four feet below 70R4. In practically all measurements and indices influenced by deformation the skull falls outside the Shell Mound ranges. These are glabello-occipital length, maximum breadth, transverse arc, length-breadth index (88.02, slight left occipital and lambdoid deformation), and length-auricular height index. The bicondylar breadth exceeds the top range of the Shell Mound series, and the auricular height equals it. None of the remaining measurements and indices exceed the "Koger's Island" ranges. The morphological observations are equivocal as to type.

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[53] Associated with this burial is a fiber-tempered pot.

[54] In association are bone and stone artifacts.

[55] A whole pot is in association, indicating the possibility that the burial belongs to the "Koger's Island" cultural complex.

No. 48.—Depth unknown, 85R4, type-5a burial. This skull is considered a "Koger's Island" type by Snow.

The foregoing methods of typing by metric analysis or by observation are by no means exact, but lacking time and larger series they must serve as a makeshift.

Now, if we attempt to correlate physical type with burial depth we find that all the "Koger's Island" type at our disposal were found at depths up to 4 feet and not below. On the other hand the five Shell Mound types were found at 5 feet and below. The dichotomy, however, is less clear if corrections for burial depth are made. This can be seen in the following table.

Table 23.—*Burial types and burial depths of the Lu° 59 skeletons*

SHELL MOUND TYPE

No.	Burial type	Given depth	Corrected depth	Remarks
14	Skull only	5 feet	?	
43	1B	5 feet 2 inches	4 feet 2 inches	Associated with No. 49.
49	1B	5 feet 2 inches	4 feet 2 inches	Fiber-tempered vessel in association.
75	5A	6 feet	3.5–4 feet	Stone and bone artifacts in association.
107	5A	5 feet 6 inches	3–3.5 feet	
		"KOGER'S ISLAND" TYPE		
2	Skull only	2 feet	?	Whole pot (Koger's Island?) in association.
15	2B	4 feet	Less than 4 feet	
18	1B	2.5 feet	1.5 feet	
34	Skull only	4 feet	?	
48	5A	?	?	

Despite the corrections for burial depth, the Shell Mound type is still deeper in the mound than the "Koger's Island" type. If some of the "Koger's Island" type burials were in very shallow graves, there is some possibility that the two groups overlapped in depth. The picture is further complicated by the three lone skulls which may indicate aboriginal disturbances. If they were disturbed, there is no way of ascertaining whether their actual burial levels were deeper or less deep than the given depths.

Obviously our data are insufficient. Indulging for the moment in speculation, however, it is to be noted first that none of the Shell Mound type were within the top zone of 2 feet which contains the shell-tempered pottery. At least two of the "Koger's Island" type were in that zone. One of these (No. 2) had a whole pot, presumably shell-tempered, in association with it. On the other hand two of the "Koger's Island" type (Nos. 15 and 34) may have originally been buried below the shell-tempered pottery zone.

Second, the Shell Mound type we have are either of type-1 or type-5 burial, and none are of the putatively intrusive type, type 3. Type-5 burials are supposed to be entirely prepottery in this mound, and hence should house solely Shell Mound physical types providing the physical and cultural differentiae are clear-cut. Yet No. 48, which was assessed as a "Koger's Island" type, was in a type-5 burial.

Finally, it would be tempting to assume that while the Shell Mound people were first without pottery entirely, and then acquired fiber-tempered pottery, the "Koger's Island" people brought in the shell-tempered pottery. But while our data might suggest such a possibility, it will take a larger series and perhaps a different method of analysis to confirm it. As it is, we prefer to leave the matter open until a reinvestigation is possible, and merely present the above data as an interesting but decidedly speculative possibility.

MISCELLANEOUS LU° 67 AND CT° 27 CRANIA

The following crania for archeological or physical reasons appear to be out of place in their respective site series. For this reason they are best treated separately.

Lu° 67–31.—Male, 4 feet 4 inches below 5L4 (zone A), lambdoid deformation of medium degree. Only the posterior portion of the skull is present, so typing is not possible. Some features more closely approach the "Koger's Island" type, and others the Shell Mound type. The skull is of primary interest because stratigraphically it belongs with the Shell Mound series, yet it shows lambdoid deformation. This type of deformation, however, may not be artificial.

Lu° 67–91.—Male, 3 feet deep, undeformed. A copper bracelet in association may indicate that the burial was intrusive. In its glabello-occipital length, length-breadth index (73.26), and bicondylar breadth the skull falls outside the "Koger's Island" ranges. In auricular height and frontal angle it exceeds the Shell Mound ranges. Morphologically the skull appears to be of Shell Mound type.

Lu° 67–10.—Female, the skull was washed out of a bank after the excavations were closed, and hence probably was a superficial burial. The skull has pronounced occipital deformation, and metrically and morphologically is an indubitable "Koger's Island" type.

Ct° 27–107.—Female, 17 inches below 60L13, undeformed. This burial may be an intrusion. In most features, however, the skull is more like a Shell Mound type, although in highness of the vault and broadness of the zygomata it more closely approaches the "Koger's Island" type. All in all, it is probably a regular Shell Mound type.

These data may indicate a number of things. First, Lu° 67–31 may be a regular Shell Mound type with a small amount of lambdoid deformation. Other than this very uncertain case we have no evidence of artificial deformation among crania of Shell Mound type.[56] Second, Lu° 67–91 and Ct° 27–107 are to be suspected of being intrusive burials on archeological grounds, yet are physically of the Shell Mound type. Therefore, intrusive burials are not necessarily of "Koger's Island" physical type, although such usually is the case. Third, Lu° 67–M indicates that Lu° 67 as well as Lu° 59 and Lu° 25 housed intrusive "Koger's Island" burials in its uppermost stratum. Hence, the superposition of brachycranic and deformed "Koger's Island" types over the dolichocranic Shell Mound types occurs in at least three Pickwick Basin sites.

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[56] Hooton (1930, pp. 37–38) has pointed out that lambdoid deformation would be well-nigh impossible to produce artificially, and feels it is better explained as one of those features common to groups of brachycephalic and dolichocephalic mixture.

CORRELATIONS OF PHYSICAL TYPE WITH BURIAL TYPE

As can be perceived in the following table, the Shell Mound physical type in our series was predominantly interred in type-1 and type-5 burials (round graves and sitting burials, respectively). On the other hand the available "Koger's Island" type was mainly found in type-2 and type-3 burials (partially flexed and extended burials, respectively).

TABLE 24.—*The relationship of physical type to burial type*

Physical type	Burial type								Total	
	1, Round grave		2, Partially flexed		3, Extended		5, Sitting burial			
	No.	*Per-cent*	*No.*	*Per-cent*	*No.*	*Per-cent*	*No.*	*Per-cent*	*No.*	*Per-cent*
Shell Mound:										
Males	18	34.6	10	19.2	5	9.6	19	36.5	52	99.9
Females	26	52.0	8	16.0	0	------	16	32.0	50	100.0
Total	44	43.1	18	17.6	5	4.9	35	34.3	102	99.9
"Koger's Island":										
Males	4	20.0	12	60.0	4	20.0	0	------	20	100.0
Females	1	7.1	7	50.0	5	35.7	1	7.1	14	99.9
Total	5	14.7	19	55.9	9	26.5	1	2.9	34	100.0

There is, of course, some overlapping. Eighteen of the 102 Shell Mound physical type were found in type-2 burials. All these are from sites Lu° 25 and Lu° 67. The only type-3 burials of Shell Mound type are males, and these are from Lu° 25, Lu° 67, and Ct° 27. None of these is a superficial burial and all the crania are definitely Shell Mound in type.

One female burial of "Koger's Island" type from Lu° 25 was found in a type-5 burial. The skull is deformed and highly brachycranic, so it is unmistakably a "Koger's Island" type. Four male and one female "Koger's Island" types from Lu° 25 are found in type-1 burials. There appears to be no correlation between sex and type of burial.

PATHOLOGY

The skeletal material from all the Pickwick Basin sites has not been completely studied from the point of view of bone pathology. All the skeletons from site Lu^{v} 92 and Lu° 67 were examined in Birmingham by one of us (Snow), and as the work progresses it will be possible to have a more complete account of the pathology present in the skeletal material of other sites. A selected lot of the most striking cases of pathology was shipped to Harvard University for more minute examination.

The most common affliction of the Pickwick Basin population seems to have been arthritis. This is most usually manifested in hypertrophic form in the lumbar vertebrae, and in arthritic changes in the sacra. The incidence of arthritic invasions of the lumbar vertebrae was about double that of the cervical vertebrae, while the thoracics seemed to be unaffected. Arthritic ankylosis is present in the lumbar vertebrae of three skeletons; one from site Lu^{v} 92, one from site Lu^{o} 67, and one from site Lu^{o} 25 S. M.

Fractures of the long bones occur in 7.5 percent (three males and two female) of the Lu^{v} 92 skeletons, according to the estimate made in Birmingham. To this should be added a case of commutated fracture of the tibia and fibula which was diagnosed for us by Dr. Wolbach and Dr. Hooton. In the Lu^{o} 25 site the incidence of fracture was lower, but the sample is decidedly insufficient. There are several other cases of repair after trauma in which some infection evidently set in. A notable case is seen in Lu^{o} 67–76 where the right mandibular condyle and glenoid fossa were ankylosed, presumably after fracture of the ascending ramus.

Most interesting is the definite diagnosis by Dr. Wolbach and Dr. Sosman of syphilis in the tibiae and femora of several Lu^{v} 92 skeletons. X-rays of the affected bones were taken by Dr. Sosman (pls. 315 and 316). His report on them to Dr. Wolbach we quote in full:

> I am enclosing the films of the bones which you asked us to X-ray. We have taken an A. P. and lateral of each. If they were routine patients, I would report them somewhat as follows:
>
> *Lu^{v} 92–18* [pl. 315].—A film of the left tibia shows marked thickening of the bone in its medial portion involving over half of the entire length of the shaft. The thickening is both endosteal and periosteal with definite narrowing of the medullary cavity. It is most marked on the anterior cortex producing a definite saber-shin deformity. The appearance is quite similar to that seen in luetic osteitis and periostitis [syphilis].
>
> *Lu^{v} 92–13* [pl. 315].—A film of the right tibia shows moderate thickening of the medial and anterior cortex of the tibia in the center of the shaft involving about half of its length. This thickened bone appears more adult and more normal in structure than the previous case. It also presents a marked saber-shin deformity. The medullary cavity is definitely narrowed in its center. The appearance is compatible with luetic osteitis and periostitis [syphilis].
>
> (NOTE.—This tibia shows numerous, transverse, white lines in the ends of the bone, about 14 in number, indicating cessation of growth or interference with nutrition at regularly recurring periods. It might well be due to long, hard winters with complete lack of vitamins.) This patient is presumably 16 years of age.
>
> *Lu^{v} 92–78* [pl. 316].—A film of the right femur shows diffuse thickening of cortical and extracortical bone in the middle third extending into the lower third, involving both sides, rather uniformly, not characteristic but rather similar to that seen in luetic osteitis and periostitis [syphilis].

[The following cases do not show processes suggesting syphilis, but are nevertheless interesting.]

Lu^{v} 92–24 [pl. 316].—A film of the left femur shows a thin, poorly developed bone, otherwise normal in appearance, except for several small areas of thickened cortex anteriorly in the lower half. These suggest small areas of periostitis, probably inflammatory.

Lu^{v} 92–54.—A portion of the skull, frontal, parietal, occipital, and temporal bone all on one side, shows thick, dense bone which otherwise appears normal. Appearance does not suggest any known pathological process. It does not simulate Paget's Disease.

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Boston, Massachusetts.

Dr. Wolbach added that in his personal experience syphilis is the only process which could account for these bone formations. According to Dr. Sosman, yaws may be eliminated from consideration in this case.

As far as we are aware these are the most categorical diagnoses of syphilis in the New World aboriginal population that have been made by acknowledged experts. These diagnoses would appear to be what many investigators have been waiting for (Hooton, 1930, pp. 311–312). From the archeological side we cannot positively assert that site Lu^{v} 92 was wholly pre-Columbian. Lacking absolute chronological dating one can never be absolutely certain that any of these comparatively recent American Indian cemeteries were completely untouched by white influence. The chances, however, are perhaps in favor of Lu^{v} 92 being a pre-Columbian site.

Inflammatory lesions of the skull occur in a few instances. Most striking is the thinning and tremendous lesion in the parietal region of Lu^{o} 59–14. The vault in this case is completely eroded for an area of over 50 sq. cm., and proliferating changes on the bony margins are conspicuous. Definite diagnosis could not be made, although Dr. Bennett suggested the possibility of a myeloma. After the diagnosis of syphilis in the long bones of Lu^{v} 92–13, 18, and 78, Dr. Wolbach stated that in all probability this vault lesion was of syphilitic origin.

Pitting and slight erosion of the vault in Lu^{v} 92–31 suggested to Dr. Wolbach and Dr. Bennett the possibility of a hamaetoma with elevation and separation of the periosteum. Slight osteoporotic pitting occurred in two crania, both from site Lu^{v} 92.[57] In the Lu^{v} 92 series about 4 percent of the crania show an infection involving the mandibular joint. In these the condyle is divided antero-posteriorly by a cleft approximately 2 mm. deep. The glenoid fossae show arthritic erosion and pitting.

Periostitis seems to be present in the bones of the lower extremities of possibly five skeletons, all from site Lu^{v} 92. One of these cases shows lesions which might suggest osteomyelitis instead. Other bones show slight inflammatory changes of undiagnosed nature.

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[57] See the discussion of osteoporosis in Hooton (1930, pp. 316–319).

DENTAL PATHOLOGY

The total Shell Mound series has a higher incidence of no antemortem tooth loss than the Lu^v 92 series, although they show a few more cases of pronounced loss (9–24 teeth). Tooth wear is definitely more pronounced in the total Shell Mound series, but the incidence of caries is much less.[58] Correlated with the greater amount of wear is a higher percentage of edge to edge bite. Further, there is less crowding in the dental arcade in the total Shell Mound series.[59]

Some of these differences, particularly in tooth wear and dental caries, probably have important dietary and other bases. Presumably the Shell Mound population was a nonagricultural riparian fishing and hunting people comparable in their economy to many other North American Indian "food gatherers." The masses of shell in the mounds they constructed probably indicate that the bivalves made up a considerable part of their diet. The possibility that they lacked the bow and arrow might make a difference in their hunting effectiveness when it came to large game animals, so a preoccupation with food secured from the river seems understandable on this basis. Mussels and the like would appear to be rather gritty fare, and ought to produce tooth wear comparable to that seen in various western agricultural groups who ground maize in stone metates and hence had a lot of grit mixed with their food. In the Southeast, however, the later agricultural peoples[60] whom we know ethnologically used wooden mortars and pestles rather than those made out of stone (Swanton, 1928, p. 689), and, hence, would not have such abrasives in their meal.

These later agriculturalists had the advantage of the bow and arrow which may have been denied to the earlier hunters and fishermen, and, therefore, could practice the hunting of larger game animals with greater success. These extremely speculative possibilities may then explain the greater tooth wear of the Shell Mound people.

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[58] Drennan's (1929, p. 79) statements in this connection are worth quoting at some length. "It is worth noting in connection with attrition that, although it often seems to involve serious destruction of the teeth, it does not seem to predispose to caries. In fact, races showing the most extreme degrees of attrition are particularly immune to the disease. There is hardly an example in this tribe [Bushman] of definite caries affecting the worn down surfaces. It would seem therefore that, given teeth which are sound in structure and composition, mechanical injuries are not sufficient to give rise to caries. In fact, the smoothing out of the fissures between the cusps may be a factor in the prevention of caries.

"On the other hand, it will be pointed out . . . how frequently the wearing down of teeth far enough to expose the pulp cavity leads to apical abscesses and periodontitis."

Leigh's (1925, pp. 184–188) work on the teeth of Sioux, Indian Knoll, Ky., Arikara, and Zuñi crania does not wholly substantiate these assumptions. The Sioux series show the least dental wear and the lowest incidence of caries.

[59] None of these differences are attributable to age, since distribution in this respect is about the same in the Lu^v 92 and total Shell Mound series.

[60] It is, of course, only an assumption that there was once a nonagricultural "platform" in the Southeast, and that agriculture came in later.

Leigh's (1925, pp. 179–199) study of the dentition of the Indian Knoll cranial series from Kentucky is particularly interesting to us here since these people presumably were living under very similar conditions to those of the Pickwick Basin Shell Mound people. He states,

> The writer has never seen lesions of attrition so generalized, developed so early in life and with such far reaching pathological results as in the crania of these Kentucky people. Over fifty per cent of the dentures exhibit third to fourth degree wear. In all there are one hundred forty-eight pulp exposures through attrition with an equal number of periapical osseous lesions resultant from pulpal necrosis. . . . Were it not for the fact that teeth usually form secondary dentine on the pulp chamber wall subjacent to the wearing surface, there would be more teeth with pulp exposures. [Leigh, 1925, p. 185.]

Leigh attributes this extreme wear to abrasives in the food, and suggests the possibility that the people chewed some habit-forming substance. He states further,

> Nor was pulp exposure with consequent abscess the only deleterious effect of attrition. When the teeth became worn beyond their convexity, the approximal contact was removed and open diastemata presented, with consequent interstitial impaction of food; and the latter, in turn, brought about inflammation and atrophy of the supporting alveolar tissues, as well as a tendency to initiate dental caries at the cervix. [Leigh, 1925, p. 186.]

In the consideration of dental caries, Leigh states (1925, p. 187), "Dental caries is infrequent in the teeth of the Kentucky tribe. In the entire group of skulls there were only 28 small lesions, which were confined to 30 percent of cases." In the total Shell Mound series 30 percent of the crania likewise were affected by caries. Leigh goes on to note the localization of areas of susceptibility, and then remarks (1925, p. 187), that—

> There are no cases of caries in children or young adults, but the few lesions occurred in persons well advanced in life. This localization and period of occurence justifies the appelation senile caries.

CONCLUSIONS

In the Pickwick Basin skeletal material there are two main physical types represented. The earliest stratigraphically is an undeformed dolichocranic type representing in unmixed form the southernmost extension of the general eastern dolichocranic group, best exemplified by the so-called northeastern Algonkins. The later intrusive deformed type links most closely with the Southeastern brachycranic group as seen in Tennessee, Arkansas, Louisiana, and Florida skeletal series. The superposition of the brachycranic over the dolichocranic type is evidenced in three Pickwick Basin shell mounds, and indicates that in northeastern Alabama at least, the latter was the earlier population.[61]

The dolichocranic Shell Mound group in Pickwick Basin, taken as a whole, diverges somewhat from the pooled northeastern and east-central Algonkin series in its smaller size, relatively higher vault, and shorter vertical facial diameters. Within this group there is some evidence of a more gracile, smaller-headed variant and a more rugged, larger-headed variant. The latter group more closely resembles the various more northerly dolichocranic series, whereas the former shows close affinities to even smaller and more gracile series from Ohio County, Ky. These series are from shell mounds with prepottery horizons similar to the Pickwick sites. It is intriguing and perhaps significant that the one Pickwick Basin site yielding this smaller, more reduced type is somewhat aberrant in the Pickwick Basin cultural complex, and of all of the sites is most similar to those in Kentucky.

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[61] Neumann (1938, p. 353) has noted mention in the literature of the replacement of dolichocranic types by brachycranic types in other parts of the eastern area. See Dixon (1923, p. 420 et seq.), Langford (1927, p. 150x), Webb and Funkhouser (1930, pp. 204–208), and Neumann (1937, pp. 262–264).

Buried in the river sand below one of the shell mounds, at a depth of 12 to 13 feet from its surface, are five male skeletons which differ little from the dolichocranic Shell Mound series. It is conceivable that they represent a more rugged variant of the Shell Mound group.

The variability of the Shell Mound series from site Lu° 25 and of the total Shell Mound series appears to be a little less, if anything, than the average variability of 14 American Indian series from various parts of the United States. The Shell Mound series, separately or collectively, appear to be somewhat more variable than the rather homogeneous Basket Maker series from Grand Gulch, Utah. They show about the same order of variability as the northeastern Algonkin series which is made up of crania from five States, but if anything are a little more homogeneous. In short, while the Shell Mound series appear to be fairly homogeneous, they are by no means as much so as is possible in American Indians.

Part of the reason for the lack of a really low order of variability in the Lu° 25 Shell Mound series might conceivably be explained by rather shaky indications of brachycranic admixture in burials from the pottery zone of this site. In another site (Lu° 59) brachycranic and dolichocranic crania seem to be stratigraphically intermingled. Purely tentatively we suggest that there may be evidence of the contact of the two physical types at this site, which is also indicated by putative admixture in the upper levels of site Lu° 25.

The brachycranic type is mainly present at two sites: a separate cemetery at Koger's Island and an intrusive cemetery in site Lu° 25. While the series from these two sites are not identical metrically, they are sufficiently alike to be considered part of the same type. This type, as represented in Pickwick Basin, principally differs metrically from the Shell Mound type in lesser vault length and greater breadth; in greater length-breadth and lesser length-height indices; and in greater facial, palatal, and mandibular breadths. The morphological differences are mainly expressed in the greater ruggedness of the brachycranic type in most features outside of the mandible. Interest-

TABLE 25.—*Cranial measurements (mm.) and indices of the Lu° 25 Shell Mound series*

Measurements (mm.) and indices	Male					Female				
	Number	Range	Mean	S. D.	V.	Number	Range	Mean	S. D.	V.
Glabello-occipital length	39	177–195	185. 26±0. 51	4. 72±0. 36	2. 55±0. 19	32	168–182	176. 72±0. 49	4. 07±0. 34	3. 30±0. 19
Maximum breadth	39	123–143	133. 74±0. 57	5. 25±0. 40	3. 93±0. 30	34	120–140	131. 09±0. 44	3. 81±0. 31	2. 91±0. 24
Basion-bregma height	20	135–147	141. 65±0. 43	2. 83±0. 30	2. 00±. 021	12	131–140	136. 75		
Auricular height	7	117–128	120. 57			2		114. 50		
Minimum frontal diameter	39	83–103	93. 44±0. 55	5. 07±0. 39	5. 43±0. 41	30	83–96	89. 70±0. 38	3. 07±0. 27	3. 42±0. 30
Thickness left parietal	7	3. 2–7. 4	5. 57			2		55. 20		
Nasion-bregma length	7	108–118	113. 00			2		109. 50		
Nasion-bregma subtense	3		23. 00			2		24. 50		
Cranial module	20	148. 67–159. 67	153. 60±0. 44	2. 89±0. 31	1. 88±0. 20	8	144. 33–151. 33	148. 38		
Horizontal circumference	33	490–536	508. 00±1. 26	10. 77±0. 89	2. 12±0. 18	25	474–504	492. 52±1. 03	7. 64±0. 73	1. 55±0. 15
Nasion-opisthion arc	5	374–388	380. 80			1		365. 00		
Transverse arc	8	304–323	316. 25			2		302. 00		
Basion-nasion length	20	96–109	103. 00±0. 57	3. 75±0. 40	3. 64±0. 39	11	97–105	100. 64		
Basion-prosthion length	14	85–107	97. 43			6	92–107	97. 67		
Frontal angle (degrees)	7	46–56	51. 57			2		52. 50		
Length-breadth index	37	65. 96–80. 79	72. 78±0. 33	2. 95±0. 23	4. 05±0. 32	30	67. 04–80. 00	74. 40±0. 33	2. 71±0. 24	3. 64±0. 32
Length-height index	20	72. 31–80. 33	77. 05±0. 32	2. 09±0. 22	2. 71±0. 29	9	73. 60–80. 92	77. 53		
Length-auricular height index	7	61. 03–68. 45	65. 02			2		64. 70		
Breadth-height index	20	95. 74–111. 81	104. 95±0. 62	4. 08±0. 44	3. 89±0. 41	11	100. 00–107. 75	104. 12		
Fronto-parietal index	37	61. 03–75. 78	69. 68±0. 36	3. 24±0. 25	4. 65±0. 36	31	62. 69–73. 17	68. 45±0. 28	2. 31±0. 20	3. 37±0. 29
Frontal subtense index	5	18. 64–32. 41	22. 37			2		22. 34		
Total facial height	5	114–123	119. 60			1		117. 00		
Upper facial height	26	63–77	71. 23±0. 49	3. 70±0. 35	5. 19±0. 49	18	55–75	66. 50		
Bizygomatic breadth	14	128–147	138. 14			10	123–133	126. 80		
Zygo-maxillare-zygo-maxillare breadth	7	88–104	97. 86			1		93. 00		
Total facial angle (degrees)	4	82–92	86. 25							
Midfacial angle (degrees)	6	82–95	88. 50			2		88. 00		
Alveolar angle (degrees)	3		72. 33							
Nasal height	28	46–58	51. 45±0. 35	2. 77±0. 25	5. 38±0. 48	19	42–53	48. 16		
Nasal breadth	25	22–29	25. 68±0. 26	1. 91±0. 18	7. 44±0. 71	12	22–27	24. 08		
Orbital height (left)	7	33. 2–41. 0	36. 18			1		36. 00		
Orbital breadth (mf.) (left)	7	39. 0–47. 5	42. 66							
Orbital breadth (d) (left)	3		42. 57							
Anterior interorbital breadth	5	20. 0–23. 1	21. 22							
Posterior interorbital breadth	2		23. 80							
Dacryal subtense	2		11. 25							
Least nasalia breadth	5	8. 0–12. 0	9. 94			2		8. 8		
Simotic subtense	5	3. 0–4. 8	3. 80			2		3. 7		
Biorbital breadth	5	93–109	100. 40							
Internal orbital width	4	92–107	97. 75			1		89. 0		
Subtense to internal orbital width	7	17. 5–21. 0	25. 88			1		17. 0		
External palatal length	4	46–55	51. 25			1		53. 0		

External palatal breadth	2		63.00			1		62.0		
Condylo-symphyeal length	7	91–104	98.28			2		95.50		
Bicondylar breadth	5	117–138	129.40			1		122.00		
Bigonial breadth	7	97–119	106.00			2		97.0		
Symphysis height	3		36.83			1		30.0		
Minimum breadth of ascending ramus	7	33.0–35.5	33.98			2		30.6		
Mandibular angle (degrees)	7	112–122	117.14			2		126.00		
Total facial index	3		86.95			1		91.41		
Upper facial index	8	47.46–55.33	50.85			8	48.00–56.39	52.90		
Nasal index	23	46.00–57.69	50.35±0.50	3.56±0.35	7.07±0.70	13	43.14–54.76	50.03		
Orbital index (mf.) (left)	7	83.33–90.00	84.82							
Orbital index (d) (left)	3		88.44							
Interorbital index	2		22.47							
Simotic subtense index	5	32.61–43.75	38.74			2		41.14		
Dacryal subtense index	2		47.49							
Internal orbital width subtense index	4	13.19–19.63	17.71			1		19.10		
External palatal index	2		129.18			1		116.98		
Cranio-facial index	13	94.20–110.69	102.58			12	91.85–101.39	96.62		
Zygo-gonial index	4	72.03–80.95	76.99			1		79.69		
Fronto-gonial index	7	105.10–116.67	112.05			2		110.71		
Zygo-frontal index	14	64.83–71.32	68.68			9	66.63–77.42	71.44		
Mandibular index	6	73.19–85.00	77.06			1		79.51		

TABLE 26.—*Cranial measurements (mm.) and indices of the Lu° 67 and Ct° 27 Shell Mound series*

Measurements (mm.) and indices	Lu° 67 Shell Mound Males			Ct° 27 Shell Mound Males			Lu° 67 Shell Mound Females			Ct° 27 Shell Mound Females		
	Number	Range	Mean	Number	Range	Mean	Number	Range	Mean	Number	Range	Mean
Glabello-occipital length	12	171–187	178.83	3	173–184	178.67	10	168–183	175.10	4	175–180	177.67
Maximum breadth	12	129–143	136.00	3	132–136	134.00	10	126–136	130.40	4	121–133	128.25
Basion-bregma height	5	132–147	138.40	2		134.50	6	130–135	133.00	1		131.00
Auricular height	11	114–122	120.64	3	114–116	115.00	8	111–120	114.75	1		121.00
Minimum frontal diameter	12	87–98	92.92	3	92–94	93.00	11	84–95	89.09	3	88–92	89.33
Thickness left parietal	13	3.0–6.7	5.19	3	4.3–6.1	5.37	12	3.8–6.6	5.09	3	3.8–5.4	4.63
Nasion-bregma length	12	106–115	111.08	2		107.00	10	101–114	106.70	3	102–109	105.00
Nasion-bregma subtense	8	20–26	22.37	2		20.50	9	10–28	23.11	3	21–25	23.33
Cranial capacity (cc.)							3		1,206.00			
Horizontal circumference	10	481–520	501.50	2		510.50	9	469–509	489.00	2		486.00
Nasion-opisthion arc	6	359–376	368.67	2		361.30	9	341–378	358.78	1		356.00
Transverse arc	10	303–319	311.80	3	300–307	303.00	9	288–306	297.33	1		307.00
Basion-nasion length	5	99–105	102.20	2		101.50	6	92–106	97.67	1		99.00
Basion-prosthion length	1		95.00	2		96.00	3		95.00			
Frontal angle (degrees)	9	49–58	51.89	2		51.00	7	49–54	52.28	1		56.00
Length-breadth index	10	73.48–81.25	76.14	3	72.83–76.30	74.34	10	71.59–78.70	74.56	3	67.22–76.0	71.76
Length-height index	4	74.32–84.48	77.97	2		75.39	5	73.60–79.17	76.24	1		73.60
Length-auricular height index	9	65.03–69.59	67.22	2	63.04–65.90	64.40	8	62.84–67.80	65.79	2		65.19
Breadth-height index	5	94.96–112.21	101.79	2		101.12	5	98.53–104.72	101.27	1		101.55
Cranial module	4	150.33–153.33	151.75	2		148.44	6	142.67–150.33	146.00	1		146.00
Fronto-parietal index	10	65.73–73.68	68.62	3	67.65–70.45	69.42	10	65.44–73.81	68.26	3	68.22–72.73	70.22
Frontal subtense index	8	17.86–23.21	19.76	2		119.13	8	18.81–25.96	24.29	3	20.19–23.53	22.22
Total facial height	5	114–126	120.60	2		117.00	6	102–119	109.83	1		110.00
Upper facial height	4	68–73	71.25	2		70.00	3	61–67	63.33	1		65.60
Bizygomatic breadth	6	133–141	137.33	1		136.00	4	130–134	131.75	1		123.00
Zygo-maxillare-zygo-maxillare breadth	5	96–110	103.60	1		99.00	8	91–102	97.00			
Total facial angle (degrees)	4	80–89	83.50	1		81.00	3		81.00	1		77.00
Midfacial angle (degrees)	7	80–94	85.87	1		88.00	4	84–90	87.00	1		82.00
Alveolar angle (degrees)	3		72.33	1		64.00	3		64.33	1		62.00
Nasal height	8	49–52	51.14	2		48.70	7	42.5–47.3	45.51	1		47.00
Nasal breadth	6	24.0–27.2	26.03	2		23.20	8	22.0–27.0	24.37	1		24.00
Orbital height (left)	7	33.0–37.1	34.66	1		36.00	7	32–35	33.51	1		36.00
Orbital breadth (mf.) (left)	5	42–45	42.92	1		36.10	6	40.0–43.1	41.68			
Orbital breadth (d) (left)	2		39.50	1		39.00	6	36.1–41.0	39.03			
Anterior interorbital breadth	4	17–20	19.00				5	15.0–23.2	18.84			
Posterior interorbital breadth	1		18.10	1		23.80	3		19.67			
Dacryal subtense				1		9.00	3		9.50			
Least nasalia breadth	5	7.6–11.7	9.48	2		10.50	6	7.0–11.1	9.10			
Simotic subtense	5	2.4–4.0	3.28	2		3.15	6	2.0–3.5	2.57			
Biorbital breadth	5	94–101	98.60	2		95.00	7	95–102	97.57	1		93.00
Internal orbital width	6	94–98	95.67	2		94.00	8	92–97	94.00			
Subtense to internal orbital width	6	15–18	17.50	2		17.50	8	15–22	16.50			

External palatal length	5	51–58	53.80	2	----------	54.50	5	46.5–54.0	50.60	1	----------	52.00
External palatal breadth	5	61–68	63.60	2	----------	61.50	7	56–65	60.57	1	----------	61.00
Condylo-symphyseal length	9	94–104	98.67	2	----------	98.00	8	95–105	98.25	2	----------	95.00
Bicondylar breadth	6	120–128	124.33	2	----------	121.50	6	109–120	114.67	2	----------	115.00
Bigonial breadth	8	94–109	102.00	2	----------	95.50	9	85–102	94.44	2	----------	99.00
Symphysis height	4	30.5–36.0	33.37	2	----------	32.60	9	27–35	32.02	1	----------	30.00
Minimum breadth of ascending ramus	11	30.0–39.3	33.86	2	----------	35.10	12	30–38	33.41	3	28.2–31.2	29.80
Mandibular angle (degrees)	10	109–132	116.50	2	----------	118.00	7	107–121	117.14	3	117–130	122.67
Total facial index	3	----------	85.91	1	----------	89.71	3	----------	84.14	1	----------	89.43
Upper facial index	1	----------	52.52	1	----------	53.68	1	----------	51.15	1	----------	52.85
Nasal index	6	46.15–52.94	50.54	2	----------	47.01	7	48.94–61.36	53.44	1	----------	51.06
Orbital index (mf.) (left)	5	77.65–81.40	80.41	----------	----------	----------	6	78.57–85.37	81.18	----------	----------	----------
Orbital index (d) (left)	2	----------	83.56	1	----------	92.31	6	82.68–91.67	86.58	----------	----------	----------
Interorbital index	1	----------	19.15	1	----------	24.24	3	----------	20.56	----------	----------	----------
Simotic subtense index	5	26.37–39.47	34.78	2	----------	30.36	6	22.22–46.57	32.87	----------	----------	----------
Dacryal subtense index	----------	----------	----------	1	----------	37.81	3	----------	48.91	----------	----------	----------
Internal orbital width subtense index	6	15.79–18.37	17.18	2	----------	18.63	8	15.79–22.68	17.47	----------	----------	----------
External palatal index	4	105.17–130.77	119.03	2	----------	114.96	4	114.81–129.03	122.26	1	----------	117.31
Cranio-facial index	6	96.40–107.63	101.94	1	----------	101.49	4	96.32–103.17	100.83	1	----------	92.48
Zygo-gonial index	4	66.67–76.69	72.22	1	----------	71.32	3	----------	71.52	1	----------	77.24
Fronto-gonial index	8	96.91–121.59	110.57	2	----------	107.45	8	89.47–114.61	105.39	1	----------	103.26
Zygo-frontal index	6	67.63–73.08	70.04	1	----------	69.12	6	63.43–73.17	68.70	1	----------	74.80
Mandibular index	6	76.19–85.83	78.47	2	----------	80.23	5	81.67–86.09	84.32	2	----------	82.61

TABLE 27.—*Cranial measurements (mm.) and indices of the total Shell Mound series*

Measurements (mm.) and indices	Male					Female				
	Number	Range	Mean	S. D.	V.	Number	Range	Mean	S. D.	V.
Glabello-occipital length	54	171-195	183. 41±0. 50	5. 41±0. 35	2. 95±0. 19	45	168-183	176. 42±0. 42	4. 14±0. 29	2. 35±0. 17
Maximum breadth	55	123-143	134. 18±0. 45	4. 92±0. 32	3. 67±0. 24	49	120-144	130. 98±0. 40	4. 18±0. 28	3. 19±0. 22
Basion-bregma height	28	132-147	140. 43±0. 49	3. 86±0. 35	2. 75±0. 25	19	131-140	135. 42		
Auricular height	21	114-128	119. 33±0. 44	2. 96±0. 31	2. 48±0. 26	12	111-121	115. 42		
Minimum frontal diameter	54	83-103	93. 37±0. 42	4. 55±0. 29	4. 87±0. 32	44	83-100	89. 52±0. 31	3. 06±0. 22	3. 42±0. 25
Thickness left parietal	23	3. 0-7. 4	5. 27±0. 16	1. 13±0. 11	2. 14±0. 21	18	3. 8-6. 6	5. 00		
Nasion-bregma length	21	104-118	111. 00±0. 34	2. 30±0. 24	2. 07±0. 22	16	101-114	106. 81		
Nasion-bregma subtense	17	19. 0-28. 5	22. 76			14	10-27	23. 36		
Cranial capacity (cc.)						3		1, 206. 0		
Horizontal circumference	45	481-536	505. 96±1. 04	10. 31±0. 73	2. 04±0. 14	36	469-521	492. 22±1. 11	9. 88±0. 79	2. 01±0. 16
Nasion-opisthion arc	14	344-388	371. 50			13	288-318	300. 36		
Transverse arc	21	300-323	310. 62±1. 02	6. 94±0. 72	2. 23±0. 23	11	341-378	359. 09		
Basion-nasion length	28	96-109	103. 25±0. 40	3. 10±0. 28	3. 00±0. 27	18	92-106	99. 44		
Basion-prosthion length	18	85-107	97. 39			9	91-107	96. 67		
Frontal angle (degrees)	18	46- 56	51. 22			11	49-56	52. 36		
Length-breadth index	52	65. 96- 81. 25	73. 35±0. 30	3. 24±0. 21	4. 42±0. 29	43	67. 22-80. 00	74. 28±0. 30	2. 95±0. 21	3. 97±0. 29
Length-height index	26	72. 31- 84. 48	77. 08±0. 32	2. 43±0. 23	3. 15±0. 29	18	73. 60-80. 92	76. 72		
Length-auricular height index	20	61. 03- 69. 59	65. 85±0. 36	2. 37±0. 25	3. 60±0. 39	13	62. 84-69. 14	65. 47		
Breadth-height index	28	94. 96-112. 21	103. 75±0. 62	4. 89±0. 44	4. 71±0. 41	18	98. 53-107. 75	103. 29		
Cranial module	27	146. 00-159. 67	152. 89±0. 39	2. 99±0. 27	1. 96±0. 18	17	142. 67-151. 33	147. 47		
Fronto-parietal index	51	61. 03- 76. 78	69. 47±0. 28	3. 00±0. 20	4. 32±0. 29	44	62. 69-73. 81	68. 55±0. 26	2. 53±0. 18	3. 69±0. 27
Frontal subtense index	16	17. 86- 25. 23	20. 08			12	18. 81-25. 96	22. 73		
Total facial height	13	112-126	119. 15			9	102-124	112. 22		
Upper facial height	33	63- 77	71. 00±0. 42	3. 57±0. 30	5. 03±0. 42	22	55-75	66. 00±0. 62	4. 30±0. 44	6. 52±0. 66
Bizygomatic breadth	21	128-147	140. 81±0. 78	5. 27±0. 55	3. 74±0. 39	16	123-134	127. 87		
Zygo-maxillare-zygo-maxillare breadth	14	88-110	99. 57			10	91-102	97. 10		
Total facial angle (degrees)	10	80- 92	84. 30			55	77-83	80. 60		
Midfacial angle (degrees)	15	80- 95	87. 33			8	82-92	87. 12		
Alveolar angle (degrees)	8	64- 80	70. 50			5	60-67	63. 20		
Nasal height	39	46- 58	50. 15±0. 28	2. 61±0. 20	5. 10±0. 39	28	42-54	47. 64±0. 40	3. 14±0. 28	6. 59±0. 59
Nasal breadth	34	19- 29	25. 53±0. 25	2. 12±0. 17	8. 30±0. 68	23	22-27	24. 39±0. 23	1. 61±0. 16	6. 60±0. 66
Orbital height (left)	15	33- 41	35. 43			10	32. 0-37. 3	34. 29		
Orbital breadth (mf.) (left)	14	36. 1- 47. 5	42. 31			7	40. 0-44. 0	42. 01		
Orbital breadth (d) (left)	7	39- 44. 6	41. 17			6	36. 1-41. 0	39. 03		
Anterior interorbital breadth	10	17- 23. 1	20. 36			5	15. 0-23. 2	18. 84		
Posterior interorbital breadth	5	18. 1- 24	22. 50			3		19. 67		
Dacryal subtense	4	7. 0- 11. 5	9. 62			3		9. 50		
Least nasalia breadth	13	7. 6- 12. 5	10. 05			8	7. 0-11. 1	8. 90		
Simotic subtense	13	2. 5- 4. 8	3. 71			8	2. 0-4. 9	2. 85		
Biorbital breadth	13	91-109	99. 08			8	93-102	97. 50		
Internal orbital width	13	90-107	96. 46			10	89-101	94. 20		
Subtense to internal orbital width	12	12- 21	16. 87			9	15-19	16. 22		
External palatal length	11	46- 58	52. 82			8	46. 5-54. 0	51. 94		

External palatal breadth	9	59- 68	63. 00			10	56- 65	61. 60		
Condylo-symphyseal length	19	91-105	98. 79			12	92-105	97. 25		
Bicondylar breadth	14	117-138	125. 57			9	111-122	115. 55		
Bigonial breadth	18	94-119	102. 61			14	85-103	96. 28		
Symphysis height	10	30- 38. 5	34. 17			11	27- 35	31. 94		
Minimum breadth of ascending ramus	21	30- 39. 3	33. 91±0. 32	2. 17±0. 23	6. 41±0. 67	18	28. 2- 38. 0	32. 55		
Mandibular angle (left) (degrees)	20	109-132	117. 60±1. 01	6. 67±0. 71	5. 67±0. 60	12	107-130	120. 00		
Total facial index	7	85. 07-89. 78	86. 90			6	83. 33- 89. 43	86. 35		
Upper facial index	10	47. 46-55. 33	51. 30			10	48. 00- 56. 39	52. 79		
Nasal index	32	39. 58-57. 69	49. 28±0. 46	3. 83±0. 32	7. 77±0. 66	20	43. 14- 61. 36	50. 10±0. 62	4. 12±0. 44	8. 22±0. 88
Orbital index (mf.) (left)	13	77. 65-90. 00	82. 86			7	78. 57- 85. 37	81. 59		
Orbital index (d) (left)	7	82. 36-92. 31	86. 73			6	82. 68- 91. 67	86. 58		
Interorbital index	5	19. 15-24. 24	21. 83			3		20. 56		
Simotic subtense index	13	22. 73-43. 75	35. 86			8	22. 22- 51. 04	330. 24		
Dacryal subtense index	4	30. 43-49. 15	40. 80			3		48. 91		
Internal orbital width subtense index	12	13. 19-19. 63	17. 49			8	15. 79- 22. 68	17. 47		
External palatal index	8	105. 17-139. 13	120. 54			7	114. 81-129. 03	120. 48		
Cranio-facial index	20	94. 20-110. 69	102. 30±0. 57	3. 76±0. 40	3. 67±0. 39	17	88. 49-103. 17	97. 36		
Zygo-gonial index	10	66. 67- 80. 95	73. 75			6	65. 38- 79. 69	74. 01		
Fronto-gonial index	18	96. 91-116. 67	110. 80			12	89. 47-121. 43	106. 15		
Zygo-frontal index	21	64. 83- 73. 08	69. 00±0. 27	1. 82±0. 19	2. 64±0. 27	16	63. 43- 77. 42	70. 62		
Mandibular index	15	73. 19- 86. 07	79. 72			8	79. 51- 86. 09	83. 41		

ing in its dietary and other implications is the greater tooth wear and lower incidence of dental caries and abscesses in the dolichocranic Shell Mound group.

The variability of the pooled brachycranic group appears to be somewhat greater than that of the Shell Mound group and the average for the U. S. A. Indians, but is about the same order as that of a pooled Florida series.

TABLE 28.—*Cranial measurements (mm.) and indices of the Ct° 27 submound series*

Measurements (mm.) and indices	Male					
	Number	Range	Mean	No. 83	No. 84	No. 85
Glabello-occipital length	5	174–190	182.20	174	188	190
Maximum breadth	5	135–141	137.60	135	141	137
Basion-bregma height	3	133–141	138.00	141	--------	133
Auricular height	4	114–121	118.00	119	121	114
Minimum frontal diameter	5	86– 98	92.60	90	98	97
Thickness left parietal	5	4.6–5.6	5.00	5.3	4.7	4.6
Nasion-bregma length	5	110–118	112.40	113	114	110
Nasion-bregma subtense	5	20– 34	22.00	20	24	21
Cranial capacity (cc.)	0	--------	--------	--------	--------	--------
Horizontal circumference	4	491–521	509.00	--------	512	521
Nasion-opisthion arc	5	366–377	372–40	366	377	375
Transverse arc	5	302–315	309.60	310	315	302
Basion-nasion length	3	94–103	98.67	94	--------	103
Basion-prosthion length	2	--------	92.00	88	--------	96
Frontal angle	4	45– 53	50.00	51	51	45
Length-breadth index	5	72.49– 77.59	75.66	77.59	75.00	72.49
Length-height index	3	70.00– 81.03	76.41	81.03	--------	70.00
Breadth-height index	3	97.08–104.44	101.24	104.44	--------	97.08
Length-auricular height index	5	60.00– 68.39	64.51	68.39	64.36	60.00
Cranial module	3	150.00–153.33	151.78	150.00	--------	153.33
Fronto-parietal index	5	62.77– 70.80	67.28	66.67	69.50	70.80
Frontal subtense index	5	17.69– 21.05	19.57	17.69	21.05	19.09
Total facial height	4	114–123	119.50	123	123	114
Upper facial height	4	69– 75	72.50	75	74	(69)
Bizygomatic breadth	3	134–142	138.67	140	142	(134)
Zygo-maxillare-zygo-maxillare breadth	3	95–107	101.67	103	107	95
Total facial angle (degrees)	4	81– 85	83.50	83	81	85
Midfacial angle (degrees)	4	81– 88	85.75	84	83	88
Alveolar angle (degrees)	4	71– 78	73.50	74	71	71
Nasal height	4	51.0– 55.6	52.52	55.6	52.5	51
Nasal breadth	4	22.1– 28.0	25.72	28	26.6	22.1
Orbital height (left)	4	33.0– 35.5	34.00	33.5	34	35.5
Orbital breadth (mf.) (left)	4	40.0– 44.0	42.62	43.3	44	(43.2?)
Orbital breadth (d) (left)	3	37.0– 41.0	39.03	39.1	41	--------
Anterior interorbital breadth	3	16.1– 21.0	19.03	16.1	--------	(20)
Posterior interorbital breadth	2	--------	22.10	21.2	--------	--------
Dacryal subtense	1	--------	10.50	--------	--------	--------
Least nasalia breadth	3	8.0– 10.0	8.67	--------	8	--------
Simotic subtense	3	37.0– 40.0	3.53	--------	4	--------
Biorbital breadth	4	97– 99	98.00	98	99	98
Internal orbital width	4	93– 97	95.25	93	97	95
Subtense to internal orbital width	4	12– 22	17.25	12	17	22
External palatal length	2	--------	52.50	51	56	--------
External palatal breadth	3	61– 68	64.33	64	68	61
Condylo-symphyseal length	4	99–104	101.25	100	102	99
Bicondylar breadth	2	--------	119.50	120	--------	98
Bigonial breadth	5	94–110	98.20	95	94	98
Symphysis height	5	33– 36	34.42	36	36	33
Minimum breadth of ascending ramus	5	34– 42.5	38.54	34	42.5	39.2
Mandibular angle (degrees)	4	103–122	111.00	122	103	105
Total facial index	4	85.07– 88.06	86.90	87.86	86.62	85.07
Upper facial index	4	51.11– 53.73	52.63	53.57	52.11	(51.10)
Nasal index	4	43.14– 50.67	47.88	50.45	50.67	43.14
Orbital index (mf.) (left)	4	77.27– 82.50	80.83	77.37	77.27	82.17
Orbital index (d) (left)	3	82.93– 89.19	85.93	85.68	82.92	--------
Interorbital index	2	--------	22.57	21.43	--------	--------
Simotic subtense index	3	36.25– 50.00	41.08	--------	50.00	--------
Dacryal subtense index	1	--------	45.65	--------	--------	--------
Internal orbital width subtense index	4	12.90– 23.61	15.70	12.90	17.53	23.61
External palatal index	3	112.60–125.49	119.84	125.49	121.43	--------
Cranio-facial index	4	97.10–103.70	99.83	103.70	100.71	97.81
Zygo-gonial index	3	66.20– 73.13	69.83	67.86	66.20	73.13
Fronto-gonial index	5	95.92–127.91	106.51	105.56	95.92	101.03
Zygo-frontal index	3	64.29– 72.39	68.56	64.29	69.01	72.39
Mandibular index	2	--------	83.24	83.33	--------	(83.15?)

TABLE 29.—*Cranial measurements (mm.) and indices of the Lu^v 92 Koger's Island proper series* [1]

Measurements (mm.) and indices	Male					Female			Total female [2]	
	No.	Range	Mean	S. D.	V.	No.	Range	Mean	Range	Mean
Glabello-occipital length	10	168–184	174. 70*			8	156–174	167. 37*	153–174	165. 21(14)
Maximum breadth	10	142–157	147. 40*			8	135–143	139. 25	135–147	141. 14(14)
Basion-bregma height	10	136–146	143. 20*			5	132–138	136. 40*	132–145	137. 78 (9)
Auricular height [2]	10	119–130	120. 28			7	116–125	120. 28*	116–128	121. 28(14)
Minimum frontal diameter	20	88–107	95. 20±. 57	3. 78±. 40	3. 97±. 42	13	85–99	91. 08		
Thickness left parietal	20	4. 3–8. 3	6. 05±. 16	1. 08±. 12	1. 78±. 19	13	4. 3–6. 6	5. 61		
Nasion-bregma length	9	105–123	111. 44*			6	104–118	109. 50*	102–118	108. 42(12)
Nasion-bregma subtense	8	18–38	23. 25*			5	21–29	23. 80*	21– 29	23. 00(11)
Cranial capacity (cc.)	5	1, 370–1, 655	1, 497. 80			2		1, 367. 00*		
Horizontal circumference	8	494–532	510. 75*			5	468–497	488. 60*	465–500	486. 55 (9)
Nasion-opisthion arc	8	346–378	359. 25*			3		352. 00*	328–332	336. 25 (8)
Transverse arc	8	320–345	326. 63*			6	303–327	316. 83	303–332	319. 17(12)
Basion-nasion length	12	91–112	104. 50			10	94–105	98. 80		
Basion-prosthion length	9	93–105	99. 00			8	90–106	97. 87		
Frontal angle (degrees)	7	52–59	55. 86*			4	53–56	54. 25*	48– 62	55. 33 (9)
Length-breadth index	10	77. 72–89. 71	84. 37*			7	78. 49–91. 67	83. 64*	78. 49– 92. 45	85. 12(12)
Length-height index	9	80. 00–86. 90	83. 04*			4	76. 74–88. 46	81. 77*	76. 74– 88. 46	82. 98 (8)
Length-aur. height index	9	69. 57–72. 35	70. 61*			5	67. 44–75. 00	72. 04*	67. 44– 77. 71	73. 75(11)
Breadth-height index	9	89. 17–100. 00	96. 68*			5	96. 50–97. 87	97. 16*	96. 50–105. 07	97. 52 (9)
Cranial module	13	152. 00–162. 00	155. 38			9	145. 67–152. 00	148. 41		
Fronto-parietal index	11	61. 15–70. 39	65. 32*			6	62. 14–67. 38	64. 69*	59. 03– 71. 22	64. 43(12)
Frontal subtense index	8	16. 22–36. 19	21. 15*			5	19. 81–24. 58	21. 47*	18. 63– 24. 58	21. 08(11)
Total facial height	8	117–131	125. 50			8	107–125	114. 75		
Upper facial height	8	68–82	75. 75			9	65–79	64. 00		
Bizygomatic breadth	13	137–155	144. 61			10	125–141	131. 50		
Zygo-maxillare-zygo-maxillare breadth	12	100–115	105. 33			7	95–102	97. 71		
Total facial angle (degrees)	9	80–89	85. 33			9	81–87	83. 00		
Midfacial angle (degrees)	9	88–94	90. 33			9	87–92	89. 00		
Alveolar angle (degrees)	8	60–79	70. 25			9	58–68	64. 00		
Nasal height	11	48. 2–58. 8	53. 32			9	45. 5–51. 0	48. 14		
Nasal breadth	10	22–28	25. 30			6	22–29	24. 67		
Orbital height (left)	14	31–41	35. 36			9	31–37	34. 01		
Orbital breadth (mf.) (left)	13	40. 0–46. 2	42. 99			7	40–46	42. 78		
Orbital breadth (d) (left)	7	35–45	41. 00			5	39. 0–44. 1	40. 42		
Anterior interorbital breadth	11	15–22	19. 46			5	16. 1–20. 5	18. 34		
Posterior interorbital breadth	7	19. 5–24. 6	22. 36			4	18. 0–25. 4	21. 40		
Dacryal subtense	7	9. 5–14. 2	11. 81			4	8. 0–10. 5	9. 66		
Least nasalia breadth	12	7–14	10. 26			9	7. 1–11. 2	9. 65		
Simotic subtense	12	2. 0–6. 0	4. 14			8	1. 5–5. 0	3. 44		
Biorbital breadth	12	97–108	101. 58			9	94–104	98. 55		

[1] One asterisk * indicates only crania with no deformation or trace—small deformation; two asterisks ** indicate crania possibly influenced by deformation.

[2] Figures for total series given for contrast with selected, for no or slight deformation.

TABLE 29.—*Cranial measurements (mm.) and indices of the Lu*ᵛ *92 Koger's Island proper series* [1]—Continued

Measurements (mm.) and indices	Male					Female			Total female	
	No.	Range	Mean	S. D.	V.	No.	Range	Mean	Range	Mean
Internal orbital width	12	94–103	98.90			9	89–100	95.44		
Subtense to internal orbital width	10	14–38	20.10			9	13–21	15.83		
External palatal length	14	50–58	54.71			7	51–58	53.71		
External palatal breadth	12	62–77	69.08			7	64–68	65.43		
Condylo-symphyseal length	21	95–113	104.29±0.70	4.78±0.50	4.58±0.48	14	94–105	101.93		
Bicondylar breadth	18	121–140	130.33			14	116–135	120.93		
Bigonial breadth	18	97–122	107.55			15	92–111	98.47		
Symphysis height	17	33.0–39.1	36.87			9	31.1–38.3	35.08		
Minimum breadth of ascending ramus	25	31.2–43.0	35.12±0.38	2.81±0.27	8.01±0.76	16	30.0–37.1	32.90		
Mandibular angle (degrees)	20	101–125	114.75±1.02	6.79±0.72	5.92±0.63	16	118–130	123.94		
Total facial index	7	84.77–90.65	88.47			6	79.85–94.70	86.34		
Upper facial index	8	47.22–56.16	52.84*			7	49.25–59.85	52.32		
Nasal index	9	40.14–55.57	46.96			6	46.81–59.18	51.48		
Orbital index (mf.) left)	11	76.09–89.13	82.94			7	73.81–82.93	77.85		
Orbital index (d) (left)	7	81.40–94.07	86.14			5	77.27–85.97	81.90		
Interorbital index	6	19.89–25.26	22.05			4	19.15–25.00	21.79		
Simotic subtense index	11	28.16–65.22	40.49			7	21.13–52.63	33.69		
Dacryal subtense index	7	43.48–64.55	52.93			4	39.06–52.63	45.87		
Internal orbital width subtense index	10	14.29–39.19	20.35			9	13.00–21.21	16.55		
External palatal index	12	106.90–146.00	126.14			7	114.29–129.41	122.00		
Cranio-facial index	8	83.20–102.76	98.31			7	87.41–94.33	89.02*	87.41–98.60	92.87
Zygo-gonial index	12	67.83–79.56	73.93			9	68.66–80.00	74.46*		
Fronto-gonial index	13	97.00–124.46	111.76			12	98.92–123.33	107.46*		
Zygo-frontal index	12	60.65–70.86	66.24			8	67.18–74.44	70.46		
Mandibular index	18	70.90–84.80	79.79			14	74.44–90.52	83.56		

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[1] One asterisk * indicates only crania with deformation or trace—small deformation; two asterisks ** indicate crania possibly influenced by deformation.

TABLE 30.—*Cranial measurements (mm.) and indices of the Lu° 25 "Koger's Island" series* [1]

Measurements (mm.) and indices	Male			Female		
	No.	Range	Mean	No.	Range	Mean
Glabello-occipital length	10	168–180	173.20*	13	152–170	161.69*
Maximum breadth	10	135–150	143.50*	14	131–148	140.07*
Basion-bregma height	7	139–145	143.71*	10	132–142	138.60*
Minimum frontal diameter	15	93–104	96.40*	14	81–96	91.86*
Horizontal circumference	8	490–518	503.62*	11	460–502	480.27
Basion-nasion length	10	93–113	104.90	11	94–106	98.45
Basion-prosthion length	8	93–105	98.88	7	88–100	92.71
Length-breadth index	9	76.84–87.57	82.01*	12	78.92–93.71	86.74*
Length-height index	7	79.55–84.44	82.40*	10	82.84–91.03	85.48*
Breadth-height index	7	93.29–108.09	99.42*	10	90.60–103.73	98.62*
Cranial module	7	152.00–159.33	154.29	10	146.00–151.00	147.20
Fronto-parietal index	9	64.83–71.32	67.93*	11	61.83–69.56	65.43*
Upper facial height	13	64–75	70.69	9	62–73	65.22
Bizygomatic breadth	4	131–143	137.20	5	127–145	131.60
Nasal height	14	49–55	52.00	11	42–55	48.73
Nasal breadth	11	23–29	26.27	8	22–25	23.62
Upper facial index	5	44.75–53.33	50.06	4	48.82–53.49	50.48
Nasal index	12	45.10–55.10	50.58	8	38.89–54.76	49.34
Cranio-facial index	3	95.62–100.71	98.78*	5	88.97–97.97	92.86*
Zygo-frontal index	5	62.24–71.72	68.82	4	71.65–73.85	72.31

[1] Asterisk* indicates only crania with small degree of deformation or less.

TABLE 31.—*Total of cranial measurements (mm.) and indices of the "Koger's Island" type*[1]

Measurements (mm.) and indices	Male					Female				
	No.	Range	Mean	S. D.	V.	No.	Range	Mean	S. D.	V.
Glabello-occipital length	20*	168–184	173. 95±0. 66	4. 39±0. 47	2. 52±0. 27	22*	152–174	164. 14±0. 81	5. 62±0. 57	3. 42±0. 35
Maximum breadth	20*	135–152	145. 45± . 78	5. 16± . 55	3. 55± . 38	22*	131–149	139. 77± . 71	4. 91± . 50	3. 51± . 36
Basion-bregma height	17*	136–146	143. 41			15*	132–142	137. 87		
Minimum frontal diameter	35	88–107	95. 69± . 46	4. 01± . 32	4. 19± . 34	27	81–99	91. 11± . 57	4. 41± . 40	4. 84± . 44
Horizontal circumference	16	494–532	507. 18			16	460–502	482. 88		
Basion-nasion length	24	91–112	104. 71± . 71	5. 14± . 50	4. 77± . 46	22	93–106	98. 50± . 57	3. 97± . 40	4. 03± . 41
Basion-prosthion length	18	93–105	98. 84			16	88–106	95. 50		
Length-breadth index	18*	77. 72–89. 71	83. 61			19*	78. 49–94. 87	85. 60		
Length-height index	16*	79. 55–86. 90	82. 76			14*	80. 23–91. 03	84. 42		
Breadth-height index	16*	89. 17–108. 09	97. 88			15*	90. 60–103. 73	98. 07		
Cranial module	23	151. 33–162. 00	154. 96± . 38	2. 78± . 27	1. 80± . 18	20	140. 33–152. 00	147. 80± . 38	2. 52± . 27	1. 70± . 18
Fronto-parietal index	16*	61. 15–75. 00	67. 23			17*	58. 57–69. 57	65. 17		
Upper facial height	22	64–82	73. 09± . 66	4. 60± . 47	6. 39± . 65	16	55–79	67. 40		
Bizygomatic breadth	9	131–155	142. 36			15	125–145	131. 53		
Nasal height	26	48–59	52. 67± . 35	2. 59± . 25	4. 93± . 47	22	40–55	48. 27± . 46	3. 19± . 32	6. 16± . 67
Nasal breadth	22	22–29	25. 78± . 26	1. 84± . 18	7. 14± . 71	15	21–29	23. 93		
Upper facial index	14	44. 75–58. 27	52. 24			11	48. 82–59. 85	51. 74		
Nasal index	23	40. 14–56. 57	48. 89± . 58	4. 10± . 41	8. 38± . 83	14*	46. 81–59. 18	50. 26		
Cranio-facial index	11*	93. 20–102. 76	98. 44			9*	87. 41–97. 97	92. 15		
Zygo-frontal index	15	60. 65–71. 43	67. 07			12	67. 18–74. 44	71. 08		

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[1] Asterisk * indicates only crania with small degree of deformation or less. Lu^{v} 92 deformation, none to small, with Lu^{o} 25 except those with fronto-occipital deformation.

TABLE 32.—*Morphological description of the crania*

MUSCULARITY

Series	Small		Medium		Large		Total
	No.	Percent	No.	Percent	No.	Percent	No.
Males							
Lu^{v} 92	1	4.2	11	45.8	12	50.0	24
Total Shell Mound	1	4.2	20	83.3	3	12.5	24
Ct^{o} 27 submound	0		4		1		5
Females							
Lu^{v} 92	10	62.5	6	37.5	0		16
Total Shell Mound	16	88.9	2	11.1	0		18

AGE

	Subadult 18–20		Young adult 21–35		Middle-aged 36–55		Old adult 56–75		Total
	No.	Percent	No.	Percent	No.	Percent	No.	Percent	No.
Males									
Lu^{v} 92	0		12	50.0	9	37.5	3	12.5	24
Total Shell Mound	0		10	41.7	9	37.5	5	20.8	24
Ct^{o} 27 submound	1		1		2		1		5
Females									
Lu^{v} 92	5	29.4	8	47.1	3	17.6	1	5.9	17
Total Shell Mound	3	15.8	14	73.7	2	10.5	0		19

DEFORMATION

Type of deformation	Lu^{v} 92 series	
	Male	Females
Occipital	3	1
Right occipital	6	2
Left occipital	2	3
Lambdoid	1	2
Fronto-occipital	2	0
Occipital and lambdoid	3	0
Right occipital and lambdoid	1	1
Left occipital and lambdoid	3	2
Left occipital and parietal	0	1
No deformation	1	3

DEGREE OF DEFORMATION

Lu^{v} 92 series	Trace		Small		Medium		Pronounced		Total
	No.	Percent	No.	Percent	No.	Percent	No.	Percent	No.
Males	3	14.3	7	33.3	9	42.9	2	9.5	21
Females	0		6	50.0	6	50.0	0		12

TABLE 32.—*Morphological description of the crania*—Continued

FORM

Series	Ellipsoid		Ovoid		Pentagonoid		Sphenoid		Brisoid		Total
	No.	Percent	No.	Percent	No.	Percent	No.	Percent	No.	Percent	No.
Males											
Total Shell Mound	1	4.2	13	54.2	7	29.2	1	4.2	2	8.3	24
Ct^{o} 27 submound	0	------	2	------	1	------	1	------	0	------	4
Females											
Total Shell Mound	0	------	4	22.2	13	72.2	1	5.6	0	------	18

FRONTAL REGION

Series	Browridges						
	Median		Divided		Continuous		Total
	No.	Percent	No.	Percent	No.	Percent	No.
Males							
Lu^{v} 92	4	16.0	20	80.0	1	4.0	25
Total Shell Mound	7	31.8	15	68.2	0	----------	22
Ct^{o} 27 submound	2	----------	3	----------	0	----------	5
Females							
Lu^{v} 92	12	75.0	4	25.0	0	----------	16
Total Shell Mound	9	50.0	9	50.0	0	----------	18

Series	Browridge size									
	Trace		Small		Medium		Large		Very large	Total
	No.	Percent	No.	Percent	No.	Percent	No.	Percent	No.	No.
Males										
Lu^{v} 92	0	-------	4	16.0	8	32.0	13	52.0	0	25
Total Shell Mound	0	-------	17	31.8	11	50.0	4	18.2	0	22
Ct^{o} 27 submound	0	-------	2	-------	1	-------	2	-------	0	5
Females										
Lu^{v} 92	4	26.7	11	73.3	0	-------	0	-------	0	15
Total Shell Mound	6	33.3	11	61.1	1	5.6	0	-------	0	18

Series	Glabella						
	Small		Medium		Large		Total
	No.	Percent	No.	Percent	No.	Percent	No.
Males							
Lu^{v} 92	4	18.2	7	31.8	11	50.0	22
Total Shell Mound	9	40.9	11	50.0	2	9.1	22
Ct^{o} 27 submound	2	----------	1	----------	2	----------	5
Females							
Lu^{v} 92	13	92.9	1	7.1	0	----------	14
Total Shell Mound	16	94.1	1	5.9	0	----------	17

TABLE 32.—*Morphological description of the crania*—Continued

FRONTAL REGION—Continued

Series	Slope										
	Bulging		None		Slight		Medium		Pronounced		Total
	No.	Percent	No.	Percent	No.	Percent	No.	Percent	No.	Percent	No.
Males											
Lu^v 92	0	------	1	4.8	6	28.6	8	38.1	6	28.6	21
Total Shell Mound	0	------	0	------	6	27.3	13	59.1	3	13.6	22
Ct^o 27 submound	0	------	0	------	1	------	2	------	2	------	5
Females											
Lu^v 92	1	7.1	0	------	12	85.7	1	7.1	0	------	14
Total Shell Mound	1	5.9	3	17.6	8	47.1	5	29.4	0	------	17

Series	Postorbital constriction						
	Small		Medium		Large		Total
	No.	Percent	No.	Percent	No.	Percent	No.
Males							
Lu^v 92	0	----------	11	52.4	10	47.6	21
Total Shell Mound	4	19.1	9	43.9	8	38.1	21
Ct^o 27 submound	1	----------	4	----------	0	----------	5
Females							
Lu^v 92	1	7.7	3	23.1	9	69.2	13
Total Shell Mound	2	11.8	10	58.8	5	29.4	17

Series	Bosses								
	None		Small		Medium		Large		Total
	No.	Percent	No.	Percent	No.	Percent	No.	Percent	No.
Males									
Lu^v 92	1	4.4	11	47.8	10	43.5	1	4.4	23
Total Shell Mound	0	--------	13	59.1	8	36.4	1	4.5	22
Ct^o 27 submound	0	--------	2	--------	3	--------	0	--------	5
Females									
Lu^v 92	0	--------	3	23.1	8	61.5	2	15.4	13
Total Shell Mound	0	--------	8	44.4	10	55.6	0	--------	18
	Median crest								
Males									
Lu^v 92	9	39.1	10	43.5	3	13.0	1	4.4	23
Total Shell Mound	4	17.4	12	52.2	5	21.7	2	8.7	23
Ct^o 27 submound	1	--------	2	--------	2	--------	0	--------	5
Females									
Lu^v 92	6	46.2	6	46.2	0	--------	1	7.7	13
Total Shell Mound	3	16.7	10	55.6	5	27.8	0	--------	18

TABLE 32.—*Morphological description of the crania*—Continued

PARIETAL REGION

Series	Sagittal elevation										
	None		Small		Medium		Large		Very large		Total
	No.	Percent	No.	Percent	No.	Percent	No.	Percent	No.	Percent	No.
Males											
Lu^{v} 92	2	8.3	4	16.7	14	58.3	4	16.7	0	------	24
Total Shell Mound	1	4.4	2	8.7	15	65.2	5	21.7	0	------	23
Ct^{o} 27 submound	0	------	1	------	4	------	0	------	0	------	5
Females											
Lu^{v} 92	0	------	8	66.7	4	33.3	0	------	0	------	12
Total Shell Mound	0	------	10	50.0	9	45.0	1	5.0	0	------	20

TEMPORAL REGION

Series	Fullness								
	Flat		Small		Medium		Large		Total
	No.	Percent	No.	Percent	No.	Percent	No.	Percent	No.
Males									
Lu^{v} 92	0	--------	4	16.7	13	54.2	7	29.2	24
Total Shell Mound	5	22.7	10	45.4	6	27.3	1	4.5	22
Ct^{o} 27 submound	0	--------	3	--------	2	--------	0	--------	5
Females									
Lu^{v} 92	1	7.1	2	14.3	9	64.3	2	14.3	14
Total Shell Mound	4	22.2	11	61.1	3	16.7	0	--------	18

Series	Sphenoid depression						
	Small		Medium		Large		Total
	No.	Percent	No.	Percent	No.	Percent	No.
Males							
Lu^{v} 92	5	29.4	6	35.3	6	35.3	17
Total Shell Mound	5	27.8	11	61.1	2	11.1	18
Ct^{o} 27 submound	0	----------	3	----------	1	----------	4
Females							
Lu^{v} 92	2	20.0	8	80.0	0	----------	10
Total Shell Mound	6	37.5	9	56.2	1	6.2	16
	Mastoids						
Males							
Lu^{v} 92	2	8.0	10	40.0	13	52.0	25
Total Shell Mound	8	34.8	14	60.9	1	4.3	23
Ct^{o} 27 submound	0	----------	4	----------	1	----------	5
Females							
Lu^{v} 92	12	75.0	4	25.0	0	----------	16
Total Shell Mound	16	80.0	3	15.0	1	5.0	20
	Supramastoid crest						
	No.	Percent	No.	Percent	No.	Percent	No.
Males							
Lu^{v} 92	1	4.2	17	70.8	6	25.0	24
Total Shell Mound	4	17.4	9	39.1	10	43.5	23
Ct^{o} 27 submound	1	------------	3	------------	1	------------	5
Females							
Lu^{v} 92	10	62.5	6	27.5	0	------------	16
Total Shell Mound	9	45.0	9	45.0	2	10.0	20

TABLE 32.—*Morphological description of the crania*—Continued

OCCIPITAL REGION

Series	Curve								
	None		Small		Medium		Pronounced		Total
	No.	Percent	No.	Percent	No.	Percent	No.	Percent	No.
Males									
Lu^{v} 92	1	4.4	17	73.9	4	17.4	1	4.4	23
Total Shell Mound	0	--------	0	--------	10	45.4	12	54.6	22
Ct^{o} 27 submound	0	--------	0	--------	5	--------	0	--------	5
Females									
Lu^{v} 92	1	7.7	7	58.8	4	30.8	1	7.7	13
Total Shell Mound	0	--------	0	--------	8	44.4	10	53.6	18

Series	Inion								
	None		Small		Medium		Large		Total
	No.	Percent	No.	Percent	No.	Percent	No.	Percent	No.
Males									
Lu^{v} 92	6	27.3	11	50.0	5	22.7	0	--------	22
Total Shell Mound	10	45.5	9	40.9	3	13.6	0	--------	22
Ct^{o} 27 submound	2	--------	1	--------	1	--------	1	--------	5
Females									
Lu^{v} 92	10	71.4	4	28.6	0	--------	0	--------	14
Total Shell Mound	15	78.9	3	15.8	1	5.3	0	--------	19

Series	Crest								
	Absent		Small		Medium		Large		Total
	No.	Percent	No.	Percent	No.	Percent	No.	Percent	No.
Males									
Lu^{v} 92	0	--------	8	36.4	13	59.1	1	4.5	22
Total Shell Mound	0	--------	7	31.8	14	63.4	1	4.5	22
Ct^{o} 27 submound	0	--------	1	--------	2	--------	2	--------	5
Females									
Lu^{v} 92	1	7.1	10	71.4	3	21.4	0	--------	14
Total Shell Mound	4	21.1	11	50.9	4	21.1	0	--------	19

Series	Shape of crest				
	Ridge		Mound		Total
	No.	Percent	No.	Percent	No.
Males					
Lu^{v} 92	21	95.4	1	4.6	22
Total Shell Mound	17	77.3	5	22.7	22
Ct^{o} 27 submound	5	----------	0	----------	5
Females					
Lu^{v} 92	9	69.2	4	30.8	13
Total Shell Mound	7	46.7	8	53.3	15

TABLE 32.—*Morphological description of the crania*—Continued

SUTURE SERRATION

Series	Lambdoid										
	Simple		Submedium		Medium		Pronounced		Very pronounced		Total
	No.	Percent	No.	Percent	No.	Percent	No.	Percent	No.	Percent	No.
Males											
Lu^{v} 92	0	------	3	14.3	6	28.6	8	38.1	4	19.1	21
Total Shell Mound	0	------	1	5.6	8	44.4	6	33.3	3	16.7	18
Ct^{o} 27 submound	0	------	1	------	4	------	0	------	0	------	5
Females											
Lu^{v} 92	1	7.1	4	28.6	2	14.3	3	21.4	4	28.6	14
Total Shell Mound	0	------	1	5.6	9	50.0	8	44.4	0	------	18
	Coronal										
Males											
Lu^{v} 92	3	15.8	7	36.8	3	15.8	6	31.6	0	------	19
Total Shell Mound	3	18.8	6	37.5	4	25.0	3	18.8	0	------	16
Ct^{o} 27 submound	0	------	0	------	2	------	1	------	0	------	3
Females											
Lu^{v} 92	0	------	2	14.3	8	57.1	3	21.4	1	7.1	14
Total Shell Mound	0	------	9	47.4	5	26.3	5	26.3	0	------	19
	Sagittal										
Males											
Lu^{v} 92	2	10.0	4	20.0	10	50.0	4	20.0	0	------	20
Total Shell Mound	0	------	1	7.7	9	69.2	3	23.1	0	------	13
Ct^{o} 27 submound	0	------	0	------	3	------	1	------	0	------	4
Females											
Lu^{v} 92	0	------	6	46.1	3	23.1	2	15.4	2	15.4	13
Total Shell Mound	0	------	6	33.3	7	38.9	5	27.8	0	------	18

CRANIAL BASE

Series	Styloids						
	Small		Medium		Large		Total
	No.	Percent	No.	Percent	No.	Percent	No.
Males							
Lu^{v} 92	3	12.0	14	56.0	8	32.0	25
Total Shell Mound	3	13.6	14	63.6	5	22.7	22
Ct^{o} 27 submound	0	----------	3	----------	2	----------	5
Females							
Lu^{v} 92	7	46.7	7	46.7	1	6.7	15
Total Shell Mound	11	57.9	8	42.1	0	----------	19

Series	Pharyngeal tubercle								
	Absent		Submedium		Medium		Large		Total
	No.	Percent	No.	Percent	No.	Percent	No.	Percent	No.
Males									
Lu^{v} 92	1	5.0	3	15.0	8	40.0	8	40.0	20
Total Shell Mound	4	21.1	3	15.8	10	52.6	2	10.5	19
Ct^{o} 27 submound	0	--------	0	--------	4	--------	0	--------	4
Females									
Lu^{v} 92	0	--------	3	27.3	6	54.5	2	18.2	11
Total Shell Mound	1	--------	6	--------	2	--------	0	--------	9

TABLE 32.—*Morphological description of the crania*—Continued

CRANIAL BASE—Continued

Series	Pharyngeal fossa								
	Absent		Submedium		Medium		Large		Total
	No.	Percent	No.	Percent	No.	Percent	No.	Percent	No.
Males									
Lu^v 92	1	5.0	6	30.0	11	55.0	2	10.0	20
Total Shell Mound	6	31.6	5	26.3	7	36.8	1	5.3	19
Ct^o 27 submound	2	--------	2	--------	0	--------	0	--------	4
Females									
Lu^v 92	0	--------	4	36.4	5	45.4	2	18.2	11
Total Shell Mound	4	--------	3	--------	2	--------	0	--------	9

Series	Glenoid fossa depth						
	Small		Medium		Large		Total
	No.	Percent	No.	Percent	No.	Percent	No.
Males							
Lu^v 92	9	36.0	14	56.0	2	8.0	25
Total Shell Mound	9	40.9	13	59.1	0	----------	22
Ct^o 27 submound	1	----------	4	----------	0	----------	5
Females							
Lu^v 92	12	75.0	4	25.0	0	----------	16
Total Shell Mound	17	85.0	3	15.0	0	----------	20

Series	Postglenoid process						
Males							
Lu^v 92	3	12.0	17	68.0	5	20.0	25
Total Shell Mound	7	30.4	12	52.2	4	17.4	23
Ct^o 27 submound	1	----------	2	----------	2	----------	5
Females							
Lu^v 92	11	68.8	5	31.2	0	----------	16
Total Shell Mound	10	50.0	10	50.0	0	----------	20

Series	Tympanic plate							
	Thin		Medium		Thick		Very thick	Total
	No.	Percent	No.	Percent	No.	Percent	No.	No.
Males								
Lu^v 92	5	20.8	10	41.7	9	37.5	0	24
Total Shell Mound	5	21.7	14	60.9	4	17.4	0	23
Ct^o 27 submound	1	---------	1	---------	3	---------	0	5
Females								
Lu^v 92	4	25.0	11	68.7	1	6.2	0	16
Total Shell Mound	4	20.0	16	80.0	0	---------	0	20

Series	Auditory meatus							
	Round		Oval		Ellipse		Slit	Total
	No.	Percent	No.	Percent	No.	Percent	No.	No.
Males								
Lu^v 92	0	---------	10	41.7	14	58.3	0	24
Total Shell Mound	1	4.6	17	71.3	4	18.2	0	23
Ct^o 27 submound	1	---------	1	---------	3	---------	0	5
Females								
Lu^v 92	1	6.2	13	81.3	2	12.5	0	16
Total Shell Mound	2	10.0	16	80.0	2	10.0	0	20

TABLE 32.—*Morphological description of the crania*—Continued

FACIAL SKELETON

Series	Orbits shape										
	Oblong		Rhomboid		Square		Ellipse		Round		Total
	No.	Percent	No.	Percent	No.	Percent	No.	Percent	No.	Percent	No.
Males											
Lu^{v} 92	5	33.3	6	40.0	3	20.0	0	------	1	6.7	15
Total Shell Mound	3	18.8	9	56.2	3	18.8	1	6.2	0	------	16
Ct^{o} 27 submound	3	------	1	------	0	------	0	------	0	------	4
Females											
Lu^{v} 92	4	40.0	4	40.0	2	20.0	0	------	0	------	10
Total Shell Mound	3	27.3	6	54.6	2	18.2	0	------	0	------	11

Series	Orbits inclination								
	None		Small		Medium		Pronounced		Total
	No.	Percent	No.	Percent	No.	Percent	No.	Percent	No.
Males									
Lu^{v} 92	0	--------	7	41.2	8	47.1	2	11.8	17
Total Shell Mound	0	--------	7	38.9	8	44.4	3	16.7	18
Ct^{o} 27 submound	0	--------	2	--------	2	--------	0	--------	4
Females									
Lu^{v} 92	0	--------	6	60.0	4	40.0	0	--------	10
Total Shell Mound	1	9.1	6	54.5	4	36.4	0	--------	11

Series	Suborbital fossa								
	Absent		Slight		Medium		Large		Total
	No.	Percent	No.	Percent	No.	Percent	No.	Percent	No.
Males									
Lu^{v} 92	2	13.3	4	26.7	7	46.7	2	13.3	15
Total Shell Mound	1	5.3	15	78.9	2	10.5	1	5.3	19
Ct^{o} 27 submound	1	--------	3	--------	0	--------	0	--------	4
Females									
Lu^{v} 92	0	--------	4	40.0	5	50.0	2	10.0	10
Total Shell Mound	2	15.4	19	69.2	2	15.4	0	--------	13

Series	Malars size								
	Small		Medium		Large		Very large		Total
	No.	Percent	No.	Percent	No.	Percent	No.	Percent	No.
Males									
Lu^{v} 92	1	4.2	10	41.7	9	37.5	4	16.7	24
Total Shell Mound	2	9.5	15	71.4	4	19.1	0	--------	21
Ct^{o} 27 submound	0	--------	3	--------	0	--------	1	--------	4
Females									
Lu^{v} 92	6	46.2	7	53.8	0	--------	0	--------	13
Total Shell Mound	9	60.0	5	33.3	1	6.7	0	--------	15

TABLE 32.—*Morphological description of the crania*—Continued

FACIAL SKELETON—Continued

Series	Malars anterior projection						
	Small		Medium		Large		Total
	No.	Percent	No.	Percent	No.	Percent	No.
Males							
Lu^v 92	0	--------	5	33.3	10	66.7	15
Total Shell Mound	0	--------	7	38.9	11	61.1	14
Ct^o 27 submound	0	--------	0	--------	4	--------	8
Females							
Lu^v 92	0	--------	3	30.0	7	70.0	10
Total Shell Mound	0	--------	2	20.0	8	80.0	10

Series	Malars lateral projection						
	Small		Medium		Large		Total
	No.	Percent	No.	Percent	No.	Percent	No.
Males							
Lu^v 92	0	--------	3	17.6	14	82.4	17
Total Shell Mound	0	--------	1	5.3	18	94.7	19
Females							
Lu^v 92	0	--------	5	50.0	5	50.0	10
Total Shell Mound	0	--------	2	20.0	8	80.0	10

Series	Marginal process								
	Absent		Submedium		Medium		Large		Total
	No.	Percent	No.	Percent	No.	Percent	No.	Percent	No.
Males									
Lu^v 92	0	--------	9	37.5	6	25.0	9	37.5	24
Total Shell Mound	0	--------	5	25.0	10	50.0	5	25.0	20
Ct^o 27 submound	0	--------	0	--------	3	--------	1	--------	4
Females									
Lu^v 92	3	23.1	7	53.8	3	23.1	0	--------	13
Total Shell Mound	1	6.7	6	40.0	8	53.3	0	--------	15

Series	Zygomatic process thickness						
	Small		Medium		Large		Total
	No.	Percent	No.	Percent	No.	Percent	No.
Males							
Lu^v 92	0	--------	10	52.6	9	47.4	19
Total Shell Mound	1	5.9	8	47.1	8	47.1	17
Ct^o 27 submound	0	--------	1	--------	3	--------	4
Females							
Lu^v 92	5	23.1	4	69.2	0	7.7	9
Total Shell Mound	3	23.1	9	69.2	1	7.7	13

TABLE 32.—*Morphological description of the crania*—Continued

FACIAL SKELETON—Continued

Series	Nasion depression								
	Absent		Small		Medium		Deep		Total
	No.	Percent	No.	Percent	No.	Percent	No.	Percent	No.
Males									
Lu^{v} 92	1	5.9	10	58.8	4	23.6	2	11.8	17
Total Shell Mound	0	--------	14	87.5	2	12.5	0	--------	16
Ct^{o} 27 submound	1	--------	2	--------	2	--------	0	--------	5
Females									
Lu^{v} 92	2	16.7	10	83.3	0	--------	0	--------	12
Total Shell Mound	4	33.3	7	58.3	1	8.3	------	--------	12

Series	Nasal root height								
	Very low		Low		Medium		High		Total
	No.	Percent	No.	Percent	No.	Percent	No.	Percent	No.
Males									
Lu^{v} 92	0	--------	9	60.0	5	33.3	1	6.7	15
Total Shell Mound	1	6.7	10	66.7	4	26.7	0	--------	15
Ct^{o} 27 submound	0	--------	1	--------	2	--------	0	--------	3
Females									
Lu^{v} 92	3	27.3	7	63.6	1	9.1	0	--------	11
Total Shell Mound	1	8.3	10	83.3	1	8.3	0	--------	12

Series	Nasal root breadth										
	Very small		Small		Medium		Large		Very large		Total
	No.	Percent	No.	Percent	No.	Percent	No.	Percent	No.	Percent	No.
Males											
Lu^{v} 92	0	------	0	------	4	28.6	9	64.3	1	7.1	14
Total Shell Mound	0	------	0	------	11	68.8	5	31.3	0	------	16
Ct^{o} 27 submound	0	------	0	------	3	------	0	------	0	------	3
Females											
Lu^{v} 92	1	9.1	0	------	5	45.4	5	45.4	0	------	11
Total Shell Mound	0	------	0	------	11	100.0	0	------	0	------	11

Series	Nasal sills								
	Absent		Dull		Medium		Sharp		Total
	No.	Percent	No.	Percent	No.	Percent	No.	Percent	No.
Males									
Lu^{v} 92	0	--------	5	22.7	7	31.8	10	45.5	
Total Shell Mound	0	--------	9	45.0	10	50.0	1	5.0	22
Ct^{o} 27 submound	2	--------	2	--------	0	--------	0	--------	20
									4
Females									
Lu^{v} 92	0	--------	1	9.1	5	45.4	5	45.4	11
Total Shell Mound	0	--------	9	64.3	5	35.7	0	--------	14

TABLE 32.—*Morphological description of the crania*—Continued

FACIAL SKELETON

Series	Absent		Small		Medium		Large		Total
	No.	Percent	No.	Percent	No.	Percent	No.	Percent	No.
Nasal spine									
Males									
Lu^v 92	0	--------	7	58.3	4	33.3	1	8.3	12
Total Shell Mound	1	8.3	6	50.0	4	33.3	1	8.3	12
Ct^o 27 submound	0	--------	2	--------	0	--------	1	--------	3
Females									
Lu^v 92	0	--------	9	--------	0	--------	0	--------	9
Total Shell Mound	0	--------	9	81.8	2	18.2	0	--------	11
Subnasal grooves									
Males									
Lu^v 92	11	55.0	8	40.0	1	5.0	0	--------	20
Total Shell Mound	7	35.0	8	40.0	4	20.0	1	5.0	20
Ct^o 27 submound	0	--------	1	--------	1	--------	2	--------	4
Females									
Lu^v 92	8	72.7	2	18.2	1	9.1	0	--------	11
Total Shell Mound	5	35.7	8	57.1	1	7.1	------	--------	14

Series	Absent		Slight		Medium		Pronounced		Total
	No.	Percent	No.	Percent	No.	Percent	No.	Percent	No.
Total prognathism									
Males									
Lu^v 92	0	--------	7	43.8	8	50.0	1	6.2	16
Total Shell Mound	0	--------	1	9.1	8	72.7	1	6.2	16
Ct^o 27 submound	0	--------	2	--------	1	--------	1	--------	4
Females									
Lu^v 92	0	--------	2	--------	4	--------	3	--------	9
Total Shell Mound	0	--------	1	--------	5	--------	1	--------	7
Midfacial prognathism									
Males									
Lu^v 92	1	6.7	12	80.0	2	13.3	0	--------	15
Total Shell Mound	0	--------	5	35.8	7	53.8	1	7.7	13
Ct^o 27 submound	1	--------	1	--------	2	--------	0	--------	4
Females									
Lu^v 92	0	--------	5	--------	2	--------	2	--------	9
Total Shell Mound	0	--------	4	--------	3	--------	0	--------	7
Alveolar prognathism									
Males									
Lu^v 92	0	--------	0	--------	5	38.5	8	61.5	13
Total Shell Mound	0	--------	5	41.7	6	50.0	1	8.3	12
Ct^o 27 submound	0	--------	0	--------	1	--------	3	--------	4
Females									
Lu^v 92	0	--------	0	--------	2	--------	7	--------	9
Total Shell Mound	0	--------	0	--------	2	--------	7	--------	9

TABLE 32.—*Morphological description of the crania*—Continued

FACIAL SKELETON—Continued

Series	Palate shape										
	Parabolic		Hyperbolic		Elliptical		Small U		Large U		Total
	No.	Percent	No.	Percent	No.	Percent	No.	Percent	No.	Percent	No.
Males											
Lu^v 92	6	42.9	3	21.4	3	21.4	1	7.1	1	7.1	14
Total Shell Mound	6	42.9	2	14.3	3	21.4	3	21.4	0	------	14
Ct^o 27 submound	2	------	0	------	1	------	0	------	1	------	4
Females											
Lu^v 92	2	------	1	------	1	------	2	------	0	------	6
Total Shell Mound	2	16.7	0	------	7	63.8	2	16.7	2	16.7	11

Series	Palate height								
	Low		Medium		High		Very high		Total
	No.	Percent	No.	Percent	No.	Percent	No.	Percent	No.
Males									
Lu^v 92	5	31.2	9	56.2	2	12.5	0	--------	16
Total Shell Mound	6	42.9	8	57.1	0	--------	0	--------	14
Ct^o 27 submound	1	--------	3	--------	0	--------	0	--------	4
Females									
Lu^v 92	2	--------	5	--------	1	--------	0	--------	8
Total Shell Mound	7	53.8	3	33.3	2	16.7	0	--------	12

Series	Palatine torus size								
	Absent		Small		Medium		Large		Total
	No.	Percent	No.	Percent	No.	Percent	No.	Percent	No.
Males									
Lu^v 92	3	25.0	6	50.0	2	16.7	1	8.3	12
Total Shell Mound	9	47.4	8	41.1	2	10.5	0	--------	19
Ct^o 27 submound	2	--------	2	--------	0	--------	0	--------	4
Females									
Lu^v 92	3	--------	3	--------	1	--------	0	--------	7
Total Shell Mound	5	38.5	6	46.2	2	15.4	0	--------	13

Series	Chin form				
	Median		Bilateral		Total
	No.	Percent	No.	Percent	No.
Males					
Lu^v 92	5	20.8	19	79.2	24
Total Shell Mound	5	22.7	17	77.3	22
Ct^o 27 submound	0	--------------	5	--------------	5
Females					
Lu^v 92	13	92.9	1	7.1	14
Total Shell Mound	10	55.6	8	44.4	18

TABLE 32.—*Morphological description of the crania*—Continued

FACIAL SKELETON—Continued

Series	Chin projection										
	Negative		Neutral		Small		Medium		Large		Total
	No.	Percent	No.	Percent	No.	Percent	No.	Percent	No.	Percent	No.
Males											
Lu^{v} 92	0	------	1	4.2	2	8.3	18	75.0	3	12.5	24
Total Shell Mound	0	------	1	4.6	3	13.6	16	72.7	2	19.1	22
Ct^{o} 27 submound	0	------	0	------	2	------	2	------	1	------	5
Females											
Lu^{v} 92	1	7.1	1	7.1	2	14.3	9	64.3	1	7.1	14
Total Shell Mound	0	------	1	5.6	6	33.3	11	61.1	0	------	18

Series	Alveolar prognathism								
	None		Slight		Medium		Pronounced		Total
	No.	Percent	No.	Percent	No.	Percent	No.	Percent	No.
Males									
Lu^{v} 92	2	9.5	7	33.3	9	42.9	2	9.5	21
Total Shell Mound	3	14.3	12	57.1	6	28.6	0	--------	21
Ct^{o} 27 submound	2	--------	2	--------	1	--------	-------	--------	5
Females									
Lu^{v} 92	2	15.4	4	30.8	5	38.4	2	15.4	13
Total Shell Mound	1	7.1	7	50.0	5	35.7	1	7.1	14

Series	Genial tubercles										
	Absent		Pit		Small		Medium		Large		Total
	No.	Percent	No.	Percent	No.	Percent	No.	Percent	No.	Percent	No.
Males											
Lu^{v} 92	0	------	0	------	9	39.1	9	39.1	5	21.7	23
Total Shell Mound	0	------	0	------	4	19.1	12	57.1	5	23.8	21
Ct^{o} 27 submound	0	------	1	------	2	------	1	------	1	------	5
Females											
Lu^{v} 92	0	------	0	------	10	62.5	6	37.5	0	------	16
Total Shell Mound	1	5.6	1	5.6	8	44.4	7	38.9	1	5.6	18

Series	Mylo-hyoid ridge								
	Absent		Slight		Medium		Pronounced		Total
	No.	Percent	No.	Percent	No.	Percent	No.	Percent	No.
Males									
Lu^{v} 92	0	--------	5	20.0	15	60.0	5	20.0	25
Total Shell Mound	0	--------	5	22.7	12	55.6	5	22.7	22
Ct^{o} 27 submound	0	--------	1	--------	2	--------	2	--------	5
Females									
Lu^{v} 92	0	--------	6	37.5	7	43.8	3	18.8	16
Total Shell Mound	0	--------	5	27.8	11	61.1	2	11.1	18

TABLE 32.—*Morphological description of the crania*—Continued

FACIAL SKELETON—Continued

Series	Pterygoid attachment								
	Small		Medium		Pronounced		Very pronounced		Total
	No.	Percent	No.	Percent	No.	Percent	No.	Percent	No.
Males									
Lu^{v} 92	0	--------	8	33.3	14	58.3	2	8.3	24
Total Shell Mound	0	--------	7	33.3	13	61.9	1	4.8	21
Ct^{o} 27 submound	0	--------	0	--------	3	--------	2	--------	5
Females									
Lu^{v} 92	7	43.8	8	50.0	1	6.2	0	--------	16
Total Shell Mound	6	33.3	12	66.7	0	--------	0	--------	18

Series	Gonial angles eversion								
	None		Small		Medium		Pronounced		Total
	No.	Percent	No.	Percent	No.	Percent	No.	Percent	No.
Males									
Lu^{v} 92	0	--------	2	8.3	9	37.5	13	54.2	24
Total Shell Mound	0	--------	0	--------	4	19.1	17	80.9	21
Ct^{o} 27 submound	0	--------	0	--------	1	--------	4	--------	5
Females									
Lu^{v} 92	0	--------	8	50.0	6	37.5	2	12.5	16
Total Shell Mound	1	5.6	1	5.6	10	55.6	6	33.3	18
	Mandibular torus								
Males									
Lu^{v} 92	14	58.3	8	33.3	2	8.3	0	--------	24
Total Shell Mound	15	68.2	6	27.3	1	4.5	0	--------	22
Ct^{o} 27 submound	4	--------	0	--------	1	--------	0	--------	5
Females									
Lu^{v} 92	12	75.0	4	25.0	0	--------	0	--------	16
Total Shell Mound	14	77.8	4	22.2	0	--------	0	--------	18

Series	Shovel-shaped incisors [1]								
	Absent		Slight		Medium		Pronounced		Total
	No.	Percent	No.	Percent	No.	Percent	No.	Percent	No.
Males									
Lu^{v} 92	0	--------	3	27.3	3	27.3	5	45.4	11
Total Shell Mound	0	--------	1	--------	4	--------	2	--------	8
Ct^{o} 27 submound	0	--------	0	--------	1	--------	2	--------	3
Females									
Lu^{v} 92	0	--------	6	60.0	1	10.0	3	30.0	10
Total Shell Mound	0	--------	1	--------	3	--------	1	--------	5

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[1] All observable cases.

TABLE 32.—*Morphological description of the crania*—Continued

TEETH

Series	Teeth lost antemortem [3]																
	0		1–4		5–8		9–12		13–16		17–20		21–24		24–28		Tota
	No.	Percent	No.	Percent	No.	Percent	No.	Percent	No.	Percent	No.	Percent	No.	Percent	No.	Percent	No.
Males																	
Lu^{v} 92	5	26.3	9	47.4	2	10.5	1	5.3	1	5.3	0	-----	0	-----	1	5.3	19
Total Shell Mound	11	52.4	3	14.3	1	4.8	3	14.3	0	-----	1	4.8	1	4.8	0	-----	21
Ct^{o} 27 submound	4	-----	0	-----	0	-----	0	-----	0	-----	0	-----	0	-----	0	-----	
Females																	
Lu^{v} 92	5	45.4	3	27.3	0	-----	3	27.3	0	-----	0	-----	0	-----	0	-----	11
Total Shell Mound	9	64.3	3	21.4	0	-----	1	7.1	0	-----	1	7.1	0	-----	0	-----	14

Series	Teeth wear										
	None		Slight		Medium		Pronounced		Very pronounced		Total
	No.	Percent	No.	Percent	No.	Percent	No.	Percent	No.	Percent	No.
Males											
Lu^{v} 92	3	13.0	9	39.1	7	30.4	4	17.4	0	------	23
Total Shell Mound	0	------	0	------	5	22.7	8	36.4	9	40.9	22
Ct^{o} 27 submound	0	------	1	------	1	------	1	------	2	------	5
Females											
Lu^{v} 92	6	40.0	4	26.7	3	20.0	2	13.3	0	------	15
Total Shell Mound	0	------	0	------	6	33.3	10	55.6	2	11.1	18

Series	Teeth caries										
	None		1–4		5–8		9–16		17–x		Total
	No.	Percent	No.	Percent	No.	Percent	No.	Percent	No.	Percent	No.
Males											
Lu^{v} 92	7	33.3	13	61.9	1	4.8	0	------	0	------	21
Total Shell Mound	14	60.9	8	34.8	1	4.3	0	------	0	------	23
Ct^{o} 27 submound	4	------	1	------	0	------	0	------	0	------	5
Females											
Lu^{v} 92	5	33.3	7	46.7	3	20.0	0	------	0	------	15
Total Shell Mound	14	82.4	3	17.6	0	------	0	------	0	------	17

Series	Abscesses						
	None		1–3		4–x		Total
	No.	Percent	No.	Percent	No.	Percent	No.
Males							
Lu^{v} 92	11	52.4	10	47.6	0	----------	21
Total Shell Mound	10	47.6	11	52.4	0	----------	21
Ct^{o} 27 submound	5	----------	0	----------	0	----------	5
Females							
Lu^{v} 92	11	73.3	4	26.7	0	----------	15
Total Shell Mound	12	70.6	5	29.4	0	----------	17

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[3] Postmortem loss of teeth is slightly more frequent in the Shell Mound series.

TABLE 32.—*Morphological description of the crania*—Continued

TEETH—Continued

Series	Bite: Under No.	Under Percent	Edge No.	Edge Percent	Slight over No.	Slight over Percent	Medium over No.	Medium over Percent	Pronounced over No.	Pronounced over Percent	Total No.
Males											
Lu^{v} 92	0	------	7	58.3	4	33.3	1	8.3	0	------	12
Total Shell Mound	0	------	15	93.7	1	6.3	0	------	0	------	16
Ct^{o} 27 submound	0	------	3	------	1	------	0	------	0	------	4
Females											
Lu^{v} 92	0	------	3	------	3	------	1	------	0	------	7
Total Shell Mound	0	------	8	72.7	3	27.3	0	------	0	------	11

Series	Crowding: Absent No.	Absent Percent	Slight No.	Slight Percent	Medium No.	Medium Percent	Pronounced No.	Pronounced Percent	Total No.
Males									
Lu^{v} 92	7	33.9	4	22.2	4	22.2	3	16.7	18
Total Shell Mound	11	77.3	1	6.7	3	20.0	0	--------	15
Ct^{o} 27 submound	4	--------	1	--------	0	--------	0	--------	5
Females									
Lu^{v} 92	9	75.0	1	8.3	2	16.7	0		12
Total Shell Mound	13	86.7	1	6.7	1	6.7	0	--------	15

TABLE 33.—*Postcranial measurements (mm.) and indices*

Series	Maximum length of femur (unpaired): Right Number	Right Range	Right Mean	Left Number	Left Range	Left Mean
Males						
Lu^{o} 25 S. M.	21	405–476	443.26	14	410–463	442.79
Lu^{o} 25 K. I.	7	415–466	439.93	7	415–461	438.36
Lu^{v} 92	31	413–482	449.79	29	427–477	451.03
Lu^{o} 67	13	415–474	442.85	14	421–463	440.21
Females						
Lu^{o} 25 S. M.	8	407–436	421.75	6	407–427	414.17
Lu^{o} 25 K. I.	6	401–436	411.50	7	401–449	422.93
Lu^{v} 92	17	383–440	412.76	16	369–440	412.00
Lu^{o} 67	11	378–424	404.62	9	380–427	403.66
	Maximum length of femur (paired)					
Males						
Lu^{o} 25 S. M.	18	405–465	440.72	18	410–467	443.61
Lu^{o} 25 K. I.	6	415–458	438.83	6	415–461	441.16
Lu^{v} 92	27	424–482	448.44	27	427–477	451.38
Lu^{o} 67	9	423–465	442.72	9	421–463	440.94
Females						
Lu^{o} 25 S. M.	10	405–449	418.70	10	401–449	419.90
Lu^{o} 25 K. I.	5	405–449	421.90	5	401–449	423.50
Lu^{v} 92	13	383–440	412.50	13	384–434	413.88
Lu^{o} 67	7	378–424	402.50	7	380–427	414.22

TABLE 33.—*Postcranial measurements (mm.) and indices*—Continued

Series	Bicondylar length of femur (unpaired)					
	Right			Left		
	Number	Range	Mean	Number	Range	Mean
Males						
Lu° 25 S. M	20	403–464	438.00	14	408–460	440.07
Lu° 25 K. I	8	412–459	433.50	6	411–455	430.83
Lu^v 92	27	410–478	448.98	27	426–471	449.00
Lu° 67	12	413–457	348.67	14	416–459	435.93
Females						
Lu° 25 S. M	9	385–432	414.17	8	388–430	409.75
Lu° 25 K. I	6	395–446	413.83	7	398–444	419.36
Lu^v 92	17	377–437	407.06	15	362–435	407.50
Lu° 67	11	373–421	400.64	10	374–423	401.70
	Bicondylar length of femur (paired)					
Males						
Lu° 25 K. I	7	412–454	432.79	7	411–455	433.50
Lu^v 92	26	422–478	447.70	26	427–471	449.12
Lu° 67	9	418–457	439.17	8	416–457	437.25
Females						
Lu° 25 S. M	11	385–446	412.32	11	388–444	414.14
Lu° 25 K. I	5	399–446	417.70	5	398–444	420.10
Lu^v 92	13	377–437	408.04	13	381–435	408.65
Lu° 67	8	378–421	400.25	8	380–423	401.75
	Maximum diameter of head of femur (unpaired)					
Males						
Lu° 25 S. M	27	40–50	45.11	25	40–50	44.48
Lu° 25 K. I	10	43–48	45.90	8	43–48	45.75
Lu^v 92	30	40–50	46.40	29	40–50	46.38
Lu° 67	19	40–47	44.50	17	38–47	43.56
Females						
Lu° 25 S. M	17	37–43	39.94	16	36–42	39.75
Lu° 25 K. I	7	37–42	39.43	8	38–42	40.12
Lu^v 92	17	37–47	40.53	15	36–45	39.80
Lu° 67	11	37–42	39.62	14	37–42	39.64
	Antero-posterior subtrochanteric diameter of femur (unpaired)					
Males						
Lu° 25 S. M	31	22–38	26.10	29	22–30	25.83
Lu° 25 K. I	10	23–30	25.20	10	24–30	26.50
Lu^v 92	32	23–31	26.84	29	24–34	27.52
Lu° 67	18	20–28	24.94	18	22–28	26.17
Females						
Lu° 25 S. M	18	20–26	22.94	18	22–27	23.39
Lu° 25 K. I	6	20–25	22.50	8	21–25	22.62
Lu^v 92	15	22–30	24.17	17	21–26	23.88
Lu° 67	14	21–26	22.50	15	21–26	23.57
	Lateral subtrochanteric diameter of femur (unpaired)					
Males						
Lu° 25 S. M	37	27–37	31.32	37	27–32	30.03
Lu° 25 K. I	10	30–34	31.80	10	29–35	31.00
Lu^v 92	31	28–38	33.32	31	26–42	31.97
Lu° 67	22	22–28	24.59	21	21–28	24.69
Females						
Lu° 25 S. M	19	26–32	28.84	18	25–32	27.56
Lu° 25 K. I	7	27–31	28.86	8	26–30	27.48
Lu^v 92	19	25–33	29.28	17	26–34	28.47
Lu° 67	14	25–31	28.07	15	25–32	28.50

TABLE 33.—*Postcranial measurements (mm.) and indices*—Continued

Series	Right Number	Right Range	Right Mean	Left Number	Left Range	Left Mean
	Antero-posterior mid-shaft diameter of femur (unpaired)					
Males						
Lu^{o} 25 S. M.	30	25–35	29.43	29	25–36	29.86
Lu^{o} 25 K. I.	10	25–33	28.80	8	26–33	28.88
Lu^{v} 92	31	27–35	31.13	32	23–38	32.12
Lu^{o} 67	22	22–32	29.05	21	24–32	28.50
Females						
Lu^{o} 25 S. M.	19	21–28	25.21	18	21–28	25.17
Lu^{o} 25 K. I.	10	29–38	32.60	5	32–38	34.40
Lu^{v} 92	19	24–28	25.84	17	24–27	25.12
Lu^{o} 67	15	22–27	24.23	13	22–27	24.54
	Lateral mid-shaft diameter of femur (unpaired)					
Males						
Lu^{o} 25 S. M.	31	22–29	25.03	30	23–27	25.10
Lu^{o} 25 K. I.	9	22–30	25.67	9	23–29	25.78
Lu^{v} 92	32	24–31	28.06	31	24–31	27.45
Lu^{o} 67	22	22–28	24.59	21	21–28	24.16
Females						
Lu^{o} 25 S. M.	19	19–26	23.01	18	19–27	23.01
Lu^{o} 25 K. I.	9	19–23	21.11	6	19–22	20.50
Lu^{v} 92	18	20–26	23.83	17	22–27	24.29
Lu^{o} 67	15	21–26	23.96	14	21–26	23.79
	Platymeric index					
Males						
Lu^{o} 25 S. M.	30	70–106	83.30	28	69–100	86.21
Lu^{o} 25 K. I.	13	70–91	80.96	12	74–97	87.17
Lu^{v} 92	36	74–108	90.65	36	73–107	85.24
Lu^{o} 67	18	69–100	83.78	19	80–104	89.16
Females						
Lu^{o} 25 S. M.	18	69–96	79.94	17	69–100	85.79
Lu^{o} 25 K. I.	7	71–83	76.64	8	72–88	82.50
Lu^{v} 92	20	63–100	83.30	19	69–90	81.26
Lu^{o} 67	14	70–90	79.86	14	72–92	82.00
	Mid-shaft index					
Males						
Lu^{o} 25 S. M.	30	74–104	85.63	28	72–96	83.64
Lu^{o} 25 K. I.	12	73–93	85.50	11	78–112	90.68
Lu^{v} 92	31	76–113	90.47	29	74–104	87.23
Lu^{o} 67	22	75–104	88.83	21	76–107	90.64
Females						
Lu^{o} 25 S. M.	18	82–109	92.28	17	79–124	93.09
Lu^{o} 25 K. I.	7	82–100	89.87	8	87–105	93.50
Lu^{v} 92	20	80–104	93.75	19	85–113	97.47
Lu^{o} 67	15	85–109	96.80	14	88–104	96.64
	Maximum length of tibia (unpaired)					
Males						
Lu^{o} 25 S. M.	23	346–393	363.89	15	333–392	368.23
Lu^{o} 25 K. I.	7	335–407	361.36	4	339–406	376.00
Lu^{v} 92	18	351–397	377.22	19	346–395	375.44
Lu^{o} 67	9	343–395	360.90	11	326–393	362.00
Females						
Lu^{o} 25 S. M.	8	308–360	336.50	10	310–363	337.90
Lu^{o} 25 K. I.	3	330–364	353.17	4	329–378	360.50
Lu^{v} 92	10	305–356	336.00	10	311–362	337.20
Lu^{o} 67	4	307–350	330.75	5	305–351	327.20

TABLE 33.—*Postcranial measurements (mm.) and indices*—Continued

Series	Maximum length of tibia (paired)					
	Right			Left		
	Number	Range	Mean	Number	Range	Mean
Males						
Lu^{o} 25 S. M.	7	316–379	349.07	7	319–388	351.57
Lu^{o} 25 K. I.	5	335–407	365.50	5	339–406	368.50
Lu^{v} 92	14	351–397	376.93	14	346–395	375.93
Lu^{o} 67	6	345–395	364.83	6	344–393	363.83
Females						
Lu^{o} 25 S. M.	6	306–366	336.83	6	309–369	338.50
Lu^{o} 25 K. I.	5	318–371	341.30	5	317–375	341.90
Lu^{v} 92	6	320–356	341.17	6	320–358	338.17
Lu^{o} 67	4	307–350	330.00	4	305–351	329.50
	Antero-posterior nutrient foramen diameter of tibia (unpaired)					
Males						
Lu^{o} 25 S. M.	28	33–42	36.96	25	34–43	36.76
Lu^{o} 25 K. I.	8	33–42	36.25	6	34–42	37.17
Lu^{v} 92	31	29–41	37.81	29	29–43	37.48
Lu^{o} 67	21	30–40	34.60	19	28–41	34.50
Females						
Lu^{o} 25 S. M.	19	25–34	30.47	19	24–35	30.84
Lu^{o} 25 K. I.	6	29–34	31.16	5	29–35	31.80
Lu^{v} 92	16	29–35	31.94	18	25–34	31.17
Lu^{o} 67	13	26–32	30.04	13	28–32	30.04
	Lateral nutrient foramen diameter of tibia (unpaired)					
Males						
Lu^{o} 25 S. M.	27	19–30	23.00	25	20–27	22.76
Lu^{o} 25 K. I.	10	20–25	23.10	6	20–24	22.17
Lu^{v} 92	31	19–30	24.13	29	21–29	24.00
Lu^{o} 67	21	17–27	22.02	20	17–27	22.30
Females						
Lu^{o} 25 S. M.	19	16–22	20.10	18	17–23	20.06
Lu^{o} 25 K. I.	6	16–25	20.33	5	17–23	20.00
Lu^{v} 92	16	19–26	21.50	18	18–23	20.83
Lu^{o} 67	21	18–24	17.35	13	17–23	18.50
	Antero-posterior mid-shaft diameter of tibia (unpaired)					
Males						
Lu^{o} 25 S. M.	22	29–37	32.59	23	29–37	33.04
Lu^{o} 25 K. I.	10	29–38	32.60	5	32–38	33.80
Lu^{v} 92	31	27–40	34.32	29	27–40	33.90
Lu^{o} 67	21	27–36	30.60	21	26–37	30.69
Females						
Lu^{o} 25 S. M.	20	23–30	26.65	19	24–31	27.16
Lu^{o} 25 K. I.	4	26–30	27.50	5	26–31	28.80
Lu^{v} 92	16	26–33	28.81	18	22–31	28.39
Lu^{o} 67	13	25–29	26.35	13	24–28	26.50
	Lateral mid-shaft diameter of tibia (unpaired)					
Males						
Lu^{o} 25 S. M.	29	18–26	20.86	25	19–25	20.96
Lu^{o} 25 K. I.	9	19–23	21.11	6	19–22	20.50
Lu^{v} 92	30	18–27	21.93	30	17–26	21.57
Lu^{o} 67	21	17–25	20.31	21	17–25	20.60
Females						
Lu^{o} 25 S. M.	18	14–21	18.28	17	15–22	18.82
Lu^{o} 25 K. I.	5	14–23	18.60	5	15–21	18.40
Lu^{v} 92	16	18–23	19.56	18	18–21	18.78
Lu^{o} 67	13	17–20	17.35	13	16–21	18.50

TABLE 33.—*Postcranial measurements (mm.) and indices*—Continued

Series	Platycnemic index of tibia					
	Right			Left		
	Number	Range	Mean	Number	Range	Mean
Males						
Lu^{o} 25 S. M.	24	54–71	61.42	22	54–71	62.59
Lu^{o} 25 K. I.	10	57–70	64.00	6	57–62	59.17
Lu^{v} 92	32	57–83	69.73	31	55–75	64.18
Lu^{o} 67	21	55–77	64.43	19	57–74	64.07
Females						
Lu^{o} 25 S. M.	16	59–80	67.38	15	58–73	65.47
Lu^{o} 25 K. I.	6	50–78	66.00	6	55–79	65.83
Lu^{v} 92	13	62–83	69.73	16	59–84	68.12
Lu^{o} 67	13	64–77	70.54	14	53–78	69.22
	Mid-shaft index of tibia					
Males						
Lu^{o} 25 S. M.	25	57–77	64.16	22	54–74	64.05
Lu^{o} 25 K. I.	10	61–71	65.10	6	58–66	61.17
Lu^{v} 92	32	55–82	62.12	33	55–74	64.92
Lu^{o} 67	21	55–75	66.48	21	56–79	66.52
Females						
Lu^{o} 25 S. M.	16	62–82	70.69	15	60–79	71.00
Lu^{o} 25 K. I.	6	47–79	65.33	6	48–86	67.67
Lu^{v} 92	15	58–74	68.63	16	58–91	68.12
Lu^{o} 67	13	58–75	67.23	13	61–77	67.92
	Maximum length of fibula (unpaired)					
Males						
Lu^{o} 25 S. M.	9	332–379	356.08	6	339–380	359.50
Lu^{o} 25 K. I.	1		366.00	1		367.00
Lu^{v} 92	9	354–370	366.24	12	338–382	366.67
Lu^{o} 67	3	339–358	347.67	3	340–356	349.00
Females						
Lu^{o} 25 S. M.	2	336–366	351.50	5	333–369	347.50
Lu^{o} 25 K. I.				1		315.00
Lu^{v} 92	8	310–356	333.00	6	310–356	329.32
Lu^{o} 67	2	312–323	317.50	2	303–314	308.50
	Maximum length of humerus (unpaired)					
Males						
Lu^{o} 25 S. M.	20	292–342	320.70	18	293–341	318.72
Lu^{o} 25 K. I.	5	306–347	322.50	5	304–329	318.90
Lu^{v} 92	31	298–343	326.52	19	293–337	320.94
Lu^{o} 67	10	299–331	318.00	9	305–327	313.11
Females						
Lu^{o} 25 S. M.	6	301–328	313.83	13	282–329	300.81
Lu^{o} 25 K. I.	5	284–323	302.10	4	286–313	301.50
Lu^{v} 92	14	283–321	300.93	13	283–321	300.46
Lu^{o} 67	4	277–316	287.00	7	275–310	292.72
	Maximum length of humerus (paired)					
Males						
Lu^{o} 25 S. M.	9	314–339	327.17	9	314–341	328.06
Lu^{o} 25 K. I.	2	306–307	306.50	2	304–308	306.00
Lu^{v} 92	19	298–342	323.24	19	293–339	321.76
Lu^{o} 67	7	299–325	317.36	7	288–327	314.79
Females						
Lu^{o} 25 S. M.	4	301–329	317.00	4	299–318	313.00
Lu^{o} 25 K. I.	4	284–323	306.50	4	286–313	302.00
Lu^{v} 92	6	287–321	306.83	6	283–321	303.83
Lu^{o} 67	4	277–302	288.00	4	275–302	287.00

TABLE 33.—*Postcranial measurements (mm.) and indices*—Continued

Series	Maximum diameter of superior articular head of humerus (unpaired)					
	Right			Left		
	Number	Range	Mean	Number	Range	Mean
Males						
Lu^{o} 25 S. M.	21	41–48	45.19	19	41–49	44.84
Lu^{o} 25 K. I.	6	43–49	46.16	8	42–49	44.88
Lu^{v} 92	32	40–50	46.47	19	40–50	45.37
Lu^{o} 67	11	41–45	43.59	11	39–48	44.32
Females						
Lu^{o} 25 S. M.	11	36–45	40.45	15	37–45	40.60
Lu^{o} 25 K. I.	7	37–42	39.00	6	36–41	38.67
Lu^{v} 92	14	36–44	39.50	12	37–42	39.50
Lu$_{o}$ 67	5	37–40	38.70	9	36–40	38.67
	Major mid-shaft diameter of humerus (unpaired)					
Males						
Lu^{o} 25 S. M.	29	21–27	23.83	26	20–27	22.04
Lu^{o} 25 K. I.	9	22–27	24.11	10	20–26	22.20
Lu^{v} 92	36	20–28	24.00	25	20–25	22.64
Lu^{o} 67	18	19–25	23.00	20	19–24	21.80
Females						
Lu^{o} 25 S. M.	19	18–24	20.68	18	18–21	19.94
Lu^{o} 25 K. I.	6	19–22	20.83	7	18–23	19.86
Lu^{v} 92	17	19–23	20.76	15	19–23	20.33
Lu^{o} 67	13	18–22	20.08	12	17–21	18.92
	Minor mid-shaft diameter of humerus (unpaired)					
Males						
Lu^{o} 25 S. M.	29	14–20	17.21	26	14–19	15.88
Lu^{o} 25 K. I.	9	16–19	17.56	10	15–19	16.70
Lu^{v} 92	37	14–21	17.73	24	14–19	16.96
Lu^{o} 67	18	14–19	16.61	20	14–17	15.65
Females						
Lu^{o} 25 S. M.	19	12–17	14.68	18	12–16	14.22
Lu^{o} 25 K. I.	6	14–17	15.33	7	13–17	14.71
Lu^{v} 92	16	14–18	15.38	15	14–17	15.40
Lu^{o} 67	13	12–15	13.69	13	12–16	13.25
	Mid-shaft index of humerus					
Males						
Lu^{v} 92	33	64–85	74.55	29	61–86	74.90
Lu^{o} 67	18	65–79	72.61	21	67–85	74.18
Females						
Lu^{v} 92	16	68–82	74.13	15	71–80	75.80
Lu^{o} 67	13	57–78	67.87	12	63–84	70.13
	Maximum length of radius (unpaired)					
Males						
Lu^{o} 25 S. M.	13	221–261	244.96	12	222–262	245.33
Lu^{o} 25 K. I.	8	233–272	249.72	4	228–254	240.50
Lu^{v} 92	21	227–275	253.91	16	241–274	255.44
Lu^{o} 67	9	238–258	244.94	10	228–260	242.90
Females						
Lu^{o} 25 S. M.	7	214–249	230.22	3	212–239	225.17
Lu^{o} 25 K. I.	2	217–243	230.00	3	214–236	221.83
Lu^{v} 92	16	210–243	228.18	11	212–243	228.86
Lu^{o} 67	6	206–239	224.50	7	218–237	227.08

TABLE 33.—*Postcranial measurements (mm.) and indices*—Continued

Series	Maximum length of ulna (unpaired)					
	Right			Left		
	Number	Range	Mean	Number	Range	Mean
Males						
Lu^{o} 25 S. M	11	242–279	263. 59	7	244–277	261. 93
Lu^{o} 25 K. I	4	251–275	265. 50	6	244–275	260. 50
Lu^{v} 92	16	248–291	272. 62	14	252–292	273. 43
Lu^{o} 67	10	250–281	266. 50	12	250–280	262. 66
Females						
Lu^{o} 25 S. M	2	246–252	249. 50	6	234–258	247. 50
Lu^{o} 25 K. I	5	231–265	248. 90	5	228–265	249. 50
Lu^{v} 92	11	229–263	245. 05	11	229–259	244. 32
Lu^{o} 67	8	236–265	240. 00	6	237–249	243. 50
	Maximum length of clavicle (unpaired)					
Males						
Lu^{o} 25 S. M	12	134–164	150. 50	10	138–160	148. 50
Lu^{o} 25 K. I	4	142–170	157. 50	8	143–167	154. 25
Lu^{v} 92	24	104–173	156. 08	20	138–167	155. 70
Females						
Lu^{o} 25 S. M	6	130–152	141. 17	5	131–158	144. 50
Lu^{o} 25 K. I	3	144–147	145. 33	2	144–152	148. 00
Lu^{v} 92	8	134–141	137. 62	12	135–155	143. 50
	Humero-femoral index					
Males						
Lu^{o} 25 S. M	13	70–76	74. 00	13	71–76	72. 92
Lu^{o} 25 K. I	3	73–75	74. 00	5	72–75	73. 80
Lu^{v} 92	23	69–76	72. 56	17	69–75	72. 12
Lu^{o} 67	8	70–77	72. 75	5	72–73	72. 80
Females						
Lu^{o} 25 S. M	3	72–73	72. 50	6	73–75	73. 83
Lu^{o} 25 K. I	3	71–75	72. 67	5	68–73	71. 00
Lu^{v} 92	12	71–75	72. 92	9	72–79	76. 44
Lu^{o} 67	5	70–79	72. 80	4	70–72	71. 25
	Tibio-femoral index					
Males						
Lu^{o} 25 S. M	15	80–86	83. 67	9	81–86	82. 22
Lu^{o} 25 K. I	3	83–84	83. 50	2	81–83	82. 00
Lu^{v} 92	17	81–86	83. 29	16	80–87	82. 56
Lu^{o} 67	7	77–85	80. 86	7	80–85	82. 29
Females						
Lu^{o} 25 S. M	5	78–85	82. 20	4	83–86	84. 25
Lu^{o} 25 K. I	2	82–85	83. 50	4	81–86	83. 00
Lu^{v} 92	9	80–84	82. 33	7	81–86	83. 29
Lu^{o} 67	4	78–84	81. 50	5	78–84	81. 60
	Radio-humeral index					
Males						
Lu^{o} 25 S. M	10	74–81	76. 90	11	75–87	78. 45
Lu^{o} 25 K. I	4	74–79	77. 25	4	75–80	77. 75
Lu^{v} 92	17	76–82	78. 41	7	76–81	79. 00
Lu^{o} 67	4	76–80	77. 75	6	72–80	76. 67
Females						
Lu^{o} 25 S. M	5	74–80	76. 40	5	71–76	73. 40
Lu^{o} 25 K. I	2	76–78	77. 00	3	75–80	77. 67
Lu^{v} 92	11	71–78	74. 73	9	72–79	76. 44
Lu^{o} 67	2	74–76	75. 00	4	74–77	75. 50

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A DESCRIPTION AND ANALYSIS OF THE PICKWICK POTTERY

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A DESCRIPTION AND ANALYSIS OF THE PICKWICK POTTERY

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INTRODUCTION

The ceramic materials found on sites in the Pickwick Basin are more or less completely described within the report on each particular site. Hence, this analysis of the pottery complex as a whole is general and not too detailed. The intention here is to stress the occurrence of ceramic wares (structurally similar pottery types) that recur in abundance on many sites yet are distinct and unique within themselves. A ceramic condition of this nature was first noted in Wheeler Basin by Griffin[1] and findings in Pickwick Basin have shown a further continuation of such a relationship.

The "wares," or groups of related pottery types, are distinguished by the type of temper. In Pickwick Basin, as in Wheeler Basin, the tempering material was a reliable diagnostic feature. Surface finish and decoration, shape, and method of manufacture all contribute to the classification of the types within the wares, but the pottery complex naturally falls into definite groups when the temper is considered as a basis of separation. The only surface finishes and decorations, as will be noted, that recur on differently tempered wares are those of wide distribution and general application, as cord-wrapped paddling, textile impressions, check stamping, and smoothing.

The discussion of the five wares in this report is followed by a brief statement attempting to relate these ceramic groups with similar occurrences elsewhere. The pottery report for Wheeler Basin covered most of the known affiliations and very little of the material in that report will be repeated herein.

FIBER-TEMPERED WARE

This pottery is typically a molded vessel tempered with vegetal fibers. This tempering material, usually a grass (but rarely whole leaves), constitutes 20–25 percent of the volume of the paste before decomposition or carbonization of the fiber. The texture is medium and often shows a laminate structure perhaps due to the fibrous aplastic. The hardness varies from 2.5–3.5, usually being less than 3. The paste core is black or clay colored, fired on exterior or/and interior to mottled black and mouse gray or black and cinnamon buff.

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[1] Griffin, James B. Report on the ceramics of Wheeler Basin. *In* An archaeological survey of Wheeler Basin on the Tennessee River in northern Alabama, by William S. Webb. Bur. Amer. Ethnol. Bull. 122, 1939.

A single whole vessel of this ware was found on the Bluff Creek site, Lu° 59. This vessel is a round bowl, approximately 25 cm. in diameter. The side walls are only slightly flaring from the vertical. The base is globular. (See pl. 154, fig. 1, site Lu° 59.)

Basal and rim sherds are found quite commonly on some sites. Most rim sherds known are of the type illustrated on the whole vessel. Some of the portions found are of entire bases which are circular and concave, rarely flat and generally 7–8 cm. in outside diameter. Rim sherds frequently show a biconical perforation, punched or drilled before hardening, 3 mm. in diameter, either singly or in pairs, 1 to 1.5 cm. beneath lip. There is no rim area except where punctations or stampings have demarcated such a zone (pl. 295, fig. 2, 1a to 1e, site Ct° 27, and pl. 155, fig. 2, site Lu° 59). On one sherd a luted rim strip 16 mm. wide, and rising to a rounded ridge 10 mm. high with vertical incised marks, was found. The lip is never uniform but is usually rounded and flattened, or flattened. Compared with other pottery, the fiber-tempered ware is quite crude in execution. Although smoothed on exterior and interior, tool and finger marks are usually present.

Various surface finish or decorative treatments are found in the Basin. The plain ware has been given the name Wheeler Plain (pl. 155, fig. 1, site Lu° 59). A common type found has been stamped over the entire exterior with a dentate or comblike tool; this type is called Alexander Dentate Stamped (pl. 156, fig. 2, site Lu° 59). Sherds with a punctate treatment over the entire surface are Bluff Creek Punctated type (pl. 155, fig. 2, site Lu° 59), and those with a surface malleated by a straight-edged tool, either sharp or rounded edge, are called Pickwick Simple Stamped (pl. 155, fig. 1, site Lu° 59), top row. Included in Bluff Creek Punctated are reed punctations, or semilunar impressions. No other types of this ware are known from the Basin.

SAND-TEMPERED WARE

Pottery tempered with clean, white, well-rounded, sand grains occurs on many of the Basin sites. The tempering particles constitute as much as 20–25 percent of the whole and are usually less than 0.25 mm. in diameter. The paste is always well consolidated and of fine texture with a hardness of 2.5 to 3. The paste is usually black to gray and the usual surface color is mouse gray.

Whole vessels of this ware are unknown but the many sherds found indicate a variety of designs and surface treatments. The form seems to be rather uniformly a globular pot either with spherical base or a subsquare base with four legs, although rim sherds are found that indicate a cup-shaped vessel of vertical sides and small diameter. On the globular vessels, the mouth flares slightly and usually bears a row of bosses on the rim about 0.5 to 1.5 cm. below lip. These bosses were produced by punching from the inner surface with a small cylindrical tool so that a pustule was raised on outer surface. Then holes were filled and smoothed over on inner surface. This feature is found with many different types of designs on the rest of the vessel.

Plain sherds of this ware are common but may be fragments of vessels that have decorative portions. However, this is known as the O'Neal Plain type (pl. 295, fig. 2, 2a, site Ct° 27). The sherds that bear incised rectilinear and curvilinear lines, as illustrated in plate 156, figure 1, 2b, site Lu° 59, are called Alexander Incised. The finely stamped designs inclosed in incised lines are recognized as Smithsonia Zone Stamped (pl. 156, fig. 1, site Lu° 59). The design resulting from pinching the moist material between thumb and forefinger is called Alexander Pinched (pl. 228, fig. 1, 2f, site Lu° 67, and pl. 156, fig. 1, 2f, site Lu° 59).

Sporadically occurring throughout the Basin are other decorative types of this ware, represented by only a few sherds. One of these is the cord-wrapped paddled type, but in this instance the paste is a micaceous clay quite different from the types described above. The paddle was usually rolled over the surface. The sherds are not thick being 4–5 mm. (pl. 295, fig. 2, 2i, site Ct° 27). At a few sites fabric-marked sand-tempered sherds were found (pl. 204, fig. 2, 2l, site Lu^v 65). The textile impression is of a close weft and wide warp and is the same as found on the Long Branch Fabric Marked pottery type, a crushed-limestone-tempered pottery. The vessel shape is the same in both cases and this represents one of the few examples of the recurrence of surface or decorative treatment on vessels of different temper. Sherds rarely found are those with cord impressions produced by imprinting single strands of twisted cord into the vessel surface. This may take the form of a design (pl. 204, fig. 2, site Lu^v 65), or the rim may be demarcated by such treatment. On sherds of this type a flaring rim is common, although straight rim sherds with a biconical perforation about 1 cm. below the lip are found.

Only occasionally are punctated sherds found in which the punctations are arranged in orderly rows to produce a design, (pl. 156, fig. 1, 2g, Lu° 59) and equally rare are sherds showing a "walked" or "staggered" trailing (pl. 156, fig. 1, 2e). Occasionally seen is a well-executed punctate design, produced as though by a hollow reed so that a circle about 1 cm. in diameter results; then inside of the circle are incised four or five smaller circles by, apparently, smaller reeds.

This design occurs on vessels of straight rims with rounded lip, the latter incised by short radial lines on outer slope.

As a whole, the sand-tempered ware constitutes the highest developed pottery both esthetically and structurally, since the designs are unequalled on other wares for degree of specialization or execution, nor is the sound quality of the pottery approached by the other tempered types.

CRUSHED-LIMESTONE-TEMPERED WARE

It may seem anomolous to be setting up a ware on the basis of a certain type of grit but crushed limestone was a typologically distinctive temper material as was true of the sand tempering material. Moreover, the decorative treatment as a whole was unique and peculiar to this temper only.

This ware is probably a coiled pottery, the temper particles, 1.5 mm. or less in diameter, constituting about 20 percent of the mass. The paste is always well consolidated and of medium-fine texture. The hardness varies from 2.0 to 2.5. The paste core is usually black, fired to light drab on exterior and interior or fired to a pinkish buff throughout.

Several decorative types occur throughout Pickwick Basin. The plain ware usually consists of round-bottomed bowls, spherical with slightly flaring mouths. In one instance the rim of this type was incised with parallel lines inclosed by incised semicircles, alternately placed on rim and shoulder (pl. 206, fig. 1, site Lu^{v} 65).

Often the base bears four short legs, about 1.5 to 3.0 cm. high, as shown in same figure. Occasionally strap handles, as illustrated in plate 205, figure 1, site Lu^{v} 65, are found. This plain type is called Mulberry Creek Plain. The general shape of a wide, slightly flaring-mouthed pot of about 20–30 cm. diameter, with a spherical base or a four-legged flat base, seems to recur with all decorative manifestations on this type ware.

Except for rare incising, all the surface treatments found on crushed-limestone-tempered ware are stamping techniques. The check or grid stamp as well as a stamped impression made with a grooved paddle are common. In the check stamped type, here called Wright Check Stamped, the individual impressions vary from 2 by 2 mm. to 8 by 7 mm. but size 3.5 by 4 mm. is most common (pl. 205, fig. 2, 6c and 6d, site Lu^{v} 65, and pl. 228, fig. 2, 3c, and 3d, Lu^{o} 67). Vessels so treated are covered with the haphazardly applied impressions from lip to base, and the stamping was often applied to the lip before a rim strip was added. This fact is apparent on all vessels of this limestone-tempered type with added rim strips. Often the legs of these vessels, if present, show the stamped impressions (pl. 205, fig. 1, site Lu^{v} 65, and pl. 228, fig. 2, site Lu^{o} 67).

The grooved paddle-stamped sherds have been named Bluff Creek Simple Stamped and were impressed with a die having longitudinal grooves 1.5 to 4 mm. wide so that a series of grooves and ridges about 3 to 6 cm. long results (pl. 205, fig. 1, 3e, site Lu^v 65). Although these impressions are usually applied parallel to the lip, the impressions do overlap one another.

Common on a few sites is the complicated stamped pottery, impressed by a die with curvilinear designs usually consisting of concentric circles with a central cross or pustule (pl. 204, fig. 2, site Lu^v 65). Rarely, concentrically incised octagons in a four-pointed star arrangement is the pattern (pl. 204, fig. 2, 6f). Several minor variations are found. Although the impressions are haphazardly applied on the body, they are carefully placed to make a continuous repetitive series of elements on the rim (pl. 204, fig. 2, 6f, site Lu^v 65). Added rim strips on these vessels are usually of the same type as found on Wright Check Stamped or Bluff Creek Simple Stamped, being about 18–32 mm. wide and about 1.5–2 mm. thick.

Crushed-limestone-tempered sherds with fabric impressions are quite common in the basin. The fabric is the weave-impression found on many sherds in the Southeast, that is, of close weft and wide warp. It is rather difficult to find well-defined imprints of the weave, for most specimens seem to have been impressed several times over the same surface portion (pl. 296, fig. 1, 3b, site Ct^o 27). Associated with sherds of the foregoing type are those impressed by plain plaited basketry, covering the vessel from lip to base (pl. 296, fig. 1). Rarely, on fabric-impressed sherds are straight rims, the usual type being slightly flaring. Pottery of this character has been called Long Branch Fabric Marked.

CLAY-GRIT-TEMPERED WARE

Pottery tempered with fragments of pulverized potsherds, or some type of clay, as well as with particles of grit constitutes an important part of the ceramic remains in Pickwick. The tempering material is usually a small portion of the paste, 10 percent or less. Some of the clay particles are 3.5 mm. in diameter but the grit (generally rounded grains of chert, quartzite, or jasper) is less than 1.5 mm. in diameter. The texture is medium but well consolidated, and the hardness varies from 2 to 3 but is only rarely below 2.5. The paste core is dull gray or black unevenly fired to a mottled gray and warm buff. Occasionally, the color of exterior and interior is cinnamon drab, or fawn, or avellaneous. The firing usually does not penetrate over 1.5 mm. but a portion of a vessel may be fired to 3.5-mm. depth.

Rim sherds of this pottery give sufficient evidence for the restoration of the vessel forms, although no complete vessels have been found. The rim is usually straight or slightly flaring and the most common body shape was a round-bottomed, globular pot of a diameter of 20 to 40 cm. at shoulder, with slightly flaring mouth. Rarely, sherds indicate a straight-sided cup, subrectangular in cross section, with a square, flat base (pl. 296, fig. 2, 4c, site Ct° 27). An added rim strip was a common feature (pl. 157, fig. 1, site Lu° 59, and pl. 259, fig. 1, 4e, site Lu^v 92), as was a series of contiguous pinched nodes or ridges just beneath lip (pl. 229, fig. 1, 4d, site Lu° 67). The rim is sometimes demarcated by a single incised line, medium deep and 10 to 30 mm. below lip; this line is sometimes smeared over by added patches of clay. The lip is usually flattened, but is rarely rounded. The body sherds are usually 8 to 9 mm. thick with lip and rims only slightly less thick. Basal sherds quite clearly indicate a coiled technique in construction.

Most sherds show a smoothed and imperfectly polished surface finish with tool striations generally showing on interior and exterior. The plain type, named McKelvey Plain, is widespread throughout the Basin. Generally the rim area is marked off by a single incised line parallel to the lip, 0.5 to 1.5 cm. below lip; usually on exterior and interior. The lip is sometimes ornamented with vertical lobes or "ears" (pl. 296, fig. 2, site Ct° 27). A biconical perforation sometimes accompanies the lobing.

Cord-marked sherds are found on several sites. Here the cord marking covers the vessel from lip to base and apparently was applied in a haphazard manner. Occasionally the cord marking has been partially obliterated by smoothing, all degrees from untouched to complete smoothing being represented. The cord apparently was a twisted-grass fiber. This type pottery has been designated Mulberry Creek Cord Marked. (See pl. 297, fig. 1, site Ct° 27.)

Wheeler Check Stamped is a type characterized by impressions from a grid or checker die, the individual checks usually being 3 by 3.5 mm. in size, although variations range from 8 by 10 mm. to 2 by 2.5 mm. The checks may be rectangular (pl. 157, fig. 1, site Lu° 59) though they are as often diamond-shaped (pl. 296, fig. 2, site Ct° 27). Here again the impressions are sometimes almost obliterated by an after treatment of smoothing. The general features and form are similar to Mulberry Creek Cord Marked.

Several minor varieties are found in the area, most of which occur on one site, the McKelvey Mound, site Hn° 1. One of this group consists of impressions of a single cord arranged in patterns. Another is the textile-impressed type similar in all respects as to weave and technique to the Long Branch Fabric Marked type. Only a few sherds of these have been found. Another variant, punctations zoned within incised lines, occurs on the subrectangular, straight-sided cups and was found only at the Mulberry Creek site, Ct° 27 (pl. 296, fig. 2, 4c, site Ct° 27). Sherds showing deeply incised lines (4h of same figure) were rare, as were sherds with shallow though narrow incised lines.

No other variations of this ware were noted.

SHELL-TEMPERED WARE

Shell-tempered pottery was the only type represented by more than one whole vessel. Some of the sites contained 10 or more such vessels and gave sufficient material for a study of the shapes, although many were zoomorphic forms that are rather individualistic.

In general, the ware is a thin, smoothed pottery, but some crude, rough pieces occurred. The coiling method of manufacture is indicated but there is rather good consolidation of the paste. The temper material is flakes of mussel shell ranging in size from less than 1 mm. in diameter to 3–4 mm. in diameter. The texture is uniformly medium and the hardness ranges from 2.5 to 3.0. Color is also variable but, apparently, is the result of different degrees of firing as the paste core is either black or gray with exterior and interior surfaces either smudged or fired to a red or buff. Of the known whole vessels, exclusive of the zoomorphic types, pots are most common. Rarely, a cup (pl. 297, fig. 2, site Ct° 27) is found or a vase (pl. 261, fig. 1, site Lu^v 92).

Strap handles varying from 4 to 2 cm. in width, and from 0.5 to 1.5 cm. in thickness are common features of the rims. The thicker handles were riveted to the vessel, as shown in plate 157, figure 2, site Lu° 59. The attachment of the handles varies, being above, below, or on same level as lip. Rarely, a loop handle occurs (pl. 160, fig. 2, site Lu° 59). The number of handles seems to be two, four, or eight, occurring only on the plain type of this ware. One vessel with nine handles occurred in the pottery zone of site Lu° 59 (pl. 154, fig. 2, site Lu° 59). One rim decoration pattern consisted of contiguous appliqué pyramids 7 by 12 mm. at base and 3 mm. high arranged in a row 2.5 mm. below lip. A flattened or rounded lip seems most common. Cups have flat lips in all cases observed. The rim of flaring-mouth pots usually shows thickening up to 12 mm. However, the vessels of shell-tempered ware are best illustrated from Koger's Island, Seven-Mile Island, and Perry sites, and the photographs of these sites showing shell-tempered pottery give a rather complete picture of this ware.

A few fabric-marked salt-pan sherds (pl. 158, fig. 1, site Lu° 59) were found on the surface of several of the sites. Rarely, a sherd with punctate designs or crudely incised decorations was found. One sherd with a cord-wrapped paddle surface treatment occurred on Bluff Creek site, Lu° 67. The preponderance of shell-tempered sherds was plain and the only well-executed ceramic examples of shell-tempered type occurred on the so-called domiciliary earth mounds and villages, as illustrated by sites Lu^{v} 92, Hn^{o} 1, and Lu^{o} 21, apparently components of the Moundville complex.

CONCLUSIONS

Since the pottery remains of Pickwick Basin are identical in typology with those of Wheeler Basin, the comparative statement compiled by Griffin[2] for the latter area will hardly need repetition here. However, a few additions and exceptions may be noted.

The fiber-tempered ware occurs on sites in Pickwick in such a manner as to indicate its priority over all other wares in the Basin. At the Bluff Creek site, Lu^{o} 59, fiber-tempered sherds occur at a depth of 6 feet and a vessel of this ware accompanied a burial at a depth of over 5 feet. Sherds of other wares are not present below a depth of 3½ feet. Hence, it is deduced that fiber-tempered ware long preceded the other wares, and, perhaps, was actually made on the site. Even above the 3½-foot depth, fiber-tempered ware is the predominate ware and steadily increases in quantity toward the surface.

The occurrence of the fiber ware is not so stratigraphically clear at other sites, but in all instances sherds of this type seem to be more abundant in relation to other wares at the lower pottery levels. This fact seems to indicate that the fiber-tempered ware was first to be introduced into the area, and the conclusion that it was first to develop in the Southeast has gradually gained support from its similar early position on many sites in the Southeast. Stirling (1935, p. 380)[3] found fiber-tempered pottery in a historic mound on the central west coast of Florida, but it may be an entirely different type. Still, the distribution of the ware is southeastern and the center of dispersion may well be in the Gulf coast region. Shell heaps in the Green River region of Kentucky have not shown a single sherd of this ware nor have any been reported even in Tennessee. Pickwick Basin seems the northwestern limit for this ware. Bushnell found ornate fiber-tempered sherds as far north as Falmouth, Va. (1935, p. 11, pl. 3, *a* and *c*)[4], and he notes the similarity of these sherds with material from Stalling's Island.

The chart showing sherd distribution for all sites demonstrates that except for one sherd on site Lu^{o} 21 (an earth mound); 77 sherds on a large village, site Lu^{v} 92; and 24 sherds from site Hn^{o} 1 (another earth mound), all the sherds of fiber-tempered ware are to be found on shell heaps. The reason for the occurrence of this fiber-tempered pottery on these sites is readily apparent from the site notes, in that all three of the sites possessed a component of the shell-mound complex. Although every shell heap investigated in the basin yielded some fiber-tempered sherds, the preponderance of the sherds came from one site, namely Bluff Creek site, Lu° 59. This site, as mentioned before, is unique in that the fiber-tempered sherds occur at such a depth as to indicate the occurrence of fiber-tempered ware for a considerable period of the occupation of the heap. The conclusion that this is the only site in the basin upon which fiber-tempered ware was manufactured is suggested but admittedly with no real proof.

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[2] Griffin, 1939. See footnote 1, p. 513.

[3] Stirling, M. W. Smithsonian archeological projects conducted under Federal Emergency Relief, 1933–34. Ann. Rep. Smithsonian Inst. 1934, pp. 371–400, 1935.

[4] Bushnell, David I., Jr. The Manhoac tribes in Virginia, 1608. Smithsonian Misc. Coll., vol. 94, No. 8, 1935.

The sand-tempered pottery is difficult to place as its relationship to the other wares is never stratigraphically clear. Within this ware are several distinct types that do recur from site to site and also several types that may be noted in other areas. As in Wheeler Basin, the sand-tempered ware is most abundant on sites with fiber-tempered ware, yet it does occur sparingly on earth mounds and certain Copena sites. A few of the sherds found on the Copena sites are similar to those occurring on the shell heaps, but most types are different. For instance, sand-tempered sherds bearing a textile impression and having other characteristics of form and technique similar to the Long Branch Fabric Marked type (crushed limestone tempered) were found. (See pl. 204, fig. 2, site Luᵛ 65. Pickwick type symbol 21.) On the same site was found a type characterized by cords impressed into the rim to form designs. Pottery that appears to be similar to both these types has been found on sites in Virginia considered by Bushnell earlier than any historic Siouan sites. (Bushnell, 1935, p. 50, pls. 3, *d;* 7, *a;* 9; and 10, *b*).[5]

Sherds of the cord-impressed-into-the-rim type and the "walked" or "staggered" trailing have been found in abundance in sand mounds along Mobile Bay.[6] As indicated in the Wheeler report, affinities of this ware probably lie to the south and east.

The crushed-limestone-tempered pottery occurred on every site investigated in the basin, but only a single sherd on three sites and quite sparingly on five other. However, it occurred abundantly on shell mounds, Copena sites, and villages of the basin.

In the Wheeler Basin discussion, Griffin concluded that the crushed-limestone-tempered pottery and the clay-grit-tempered ware were culturally related. Findings in Pickwick Basin, however, seem to indicate the reverse, since sites like Luᵛ 65, a village tentatively assigned to the Copena Focus, contained almost 4,000 sherds of the former type, whereas only 48 clay-grit-tempered sherds were found. Again, site Hn° 1, with an unknown component between a shell-mound component and a Moundville component, had 20,682 sherds, all of which were statistically analyzed showing 19,755 clay-grit sherds and only 162 crushed-limestone-tempered sherds. This "counter-balance" of types or abundance of clay-grit, when limestone was scarce and vice versa, was taken as another indication or substantiation of cultural connection in Wheeler, but such an inference does not follow in Pickwick. Sites with a preponderance of clay-grit sherds possess a Moundville complex component and a component of unknown cultural affiliations. The single village with a majority of its sherds crushed limestone is tentatively considered Copena. This relationship is shown in the chart of sherd distribution (table 1).

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[5] Bushnell, 1935. See footnote 4, p. 520.

[6] DeJarnette, David L., Alabama Museum of Natural History. Tuscaloosa, Ala., personal communication.

A careful examination of the description of site Hn° 1 discloses that a pyramidal mound surmounted by a rectangular house structure was built by the aborigines of unknown cultural connections mentioned above. This was later covered by a component referred to the Moundville complex. From the excavation of this site it was determined that the builders of this pyramidal mound were responsible for the large number of clay-grit sherds associated with the site.

Certain of those sherds are shown in plate 14, site Hn° 1, and special attention is called to the three-lined incised sherds as well as the plain type at top. These latter are McKelvey Plain and are entirely similar to the Coles Creek plain ware of Louisiana.[7] The incised ware suggests a three-line motif found on certain Natchez sites in Louisiana (Ford, 1936, pp. 63, 67)[8].

At this time it is impossible to draw too definite a conclusion about the clay-grit pottery. However, certain elements about this pottery recur on many of the sites in Pickwick and their only known similarities are on the lower Mississippi in Louisiana and Mississippi. For instance, one of the characteristics of Coles Creek pottery incising is such that an "overhanging" line is produced. This appears frequently in Pickwick on sherds with lines or a line incised parallel to the lip, as seen in plate 296, figure 2, 4c and 4h, site Ct° 27. This is quite similar to those found at Deasonville (Collins)[9] also. Another feature is the vertical lobes or "ears" on the lip of vessels as in figure cited above. This is found sparingly in Louisiana on Coles Creek sites (Ford, 1936, p. 211, fig. 39, *g*). Found in the Deasonville complex are sherds with curving bands of punctations bordered by incised lines and the same motif is seen on sherds from square, beaker-shaped vessels from site Ct° 27. (See pl. 296, fig. 2, 4c, site Ct° 27.) Cord-marked sherds and Mulberry Creek Cord Marked from Pickwick are very similar to the sherds from Deasonville illustrated by Collins (1932, pl. 2). Several other features are similar but so little is known of the archeology of the Louisiana area as yet that a cultural connection may only be hinted. For instance, many Coles Creek sites in Louisiana and Mississippi are characterized by pyramidal mounds—just such mounds as site Hn° 1.

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[7] Ford, J. A., personal communication.

[8] Ford, J. A. Analysis of Indian village site collections from Louisiana and Mississippi. Anthrop. Studies No. 2, Dept. Conservation, La. Geol. Surv., New Orleans, 1936.

[9] Collins, H. B., Jr. Excavations at a prehistoric Indian village site in Mississippi. Proc. U. S. Nat. Mus., vol. 79, art. 32, 1932.

The shell-tempered pottery seems to fall into two groups—a focus of the middle Mississippi phase and a group of components of the Moundville complex. An insufficient knowledge of exactly what ceramic traits are Moundville prevents an accurate analysis of this pottery. However, it is well established from the other artifactual material from these Moundville components that they were quite late in Pickwick chronology, always overlying clay-grit, limestone, sand, and fiber-tempered wares. The relationships of the middle Mississippi material, as Griffin indicated in the Wheeler report, are to the west.

SUMMARY

The ceramic remains of Pickwick Basin are separable into five distinct groups. These groups are based on the tempering materials, namely, fiber, sand, crushed limestone, clay-grit, and shell. The fiber-tempered ware preceded all other types in the basin and was probably imported onto the shell mounds by their later dwellers. Fiber-tempered ware ceased to be used before the advent of peoples responsible for Copena, Moundville, Coles Creek-Deasonvillelike, and middle Mississippi components.

Sand-tempered sherds parallel fiber in distribution within the basin and passed through a similar history. This ware was probably traded in from the south and east. The textile-impressed sherds from east probably arrived later in the basin at a time when Copena sites were occupied.

Crushed-limestone ware seems culturally connected with Copena and the clay-grit pottery seems related to a part of the Coles Creek-Deasonville complex of Louisiana. The shell-tempered ware is in part Moundville and in part middle Mississippian.

From the stratigraphic occurrences on the shell heaps themselves, it is concluded that few peoples of the shell-mound complex itself knew pottery very intimately but rather the thin layer of pottery at the top accumulated quite rapidly since it came onto the sites by trade from a variety of sources. Further, most of this pottery may really be the refuse of chance visitors, for the sherds, other than fiber tempered, are concentrated in the top 1 or 2 feet of most heaps. Archeologically, the shell heaps seemed to have been deserted when peoples of other traditions came into the basin. The top foot or so would naturally be much disturbed by visitors and consequently show artifacts of the shell-mound complex.

This report has merely raised many questions and settled none, but the suggested chronology may lead to much needed studies of the ceramic relations in the Southeast.

TABLE 1.—*Sherd distribution*

Temper	Type name	Surface finish and decoration or type criterion	Type symbol	Site																			Type totals
				Ct^o 27 S. M.[1]	Ct^o 34 S. M.	Ct^o 42 Cave	Lu^o 5 S. M.	Lu^o 21 E. M.[1]	Lu^o 25 S. M.	Lu^o 54 Cop[1]	Lu^o 59 S. M.	Lu^o 61 S. M.	Lu^v 62 S. M.	Lu^o 63 Cop.	Lu^o 64 Cop.	Lu^v 65 Cop.	Lu^o 67 S. M.	Lu^o 72 S. M.	Lu^v 92 Village	Hn^o 1 E. M.	Hn^o 4 Cop.	Hn^o 49 Cop.	
Vegetal fiber	Wheeler Plain	Smoothed	1a	26	10		27	1	133		714	11	12				27	29	63	12			1, 065
	Bluff Creek Punctated	Single punctations; fine or coarse.	1b	2			9		177		397						17	18	7	12			639
	Bluff Creek Punctated	Semilunar punctations	1d	1					17		10						2	2					32
	Bluff Creek Punctated	Circular punctations	1f						9		3							9					21
	Alexander Dentate Stamped.	Linear stamp by a toothed tool.	1c	6					74		1, 061						4		7				1, 152
	Pickwick Simple Stamped.	Straight-edged tool or grooved paddle.	1e	1					29		77	1					2						110
Sand	O'Neal Plain	Smoothed	2a	10		2	2	4	147		144	9	1			36	19	7	11	26			418
	Alexander Incised	Rectilinear incised lines	2b	10		1	2		125		119	12					12	5		7			293
	Alexander Incised	Curvilinear incised lines	2d	2					9		7	1				2	9						30
	Smithsonia Zone Stamped.	Dentate stamping within incised lines.	2c				3		23		26						2	1		1			56
		Pinched between thumb and forefinger.	2f	6					35		58	2				2					1		104
		"Walked" or "Staggered" trailing.[2]	2e						2		1	5											8
	Alexander Pinched	Designs of individual punctations.	2g	3					4		7						2		1	1			18
		Cords impressed in designs.	2i	3												9							12
		Impressed by a textile	2l						1							13				1			15
Crushed limestone.	Mulberry Creek Plain	Smoothed	3a	72	5	6	41	3	320	2	473	11		60		2, 000	109	2	295	52	1		3, 452
	Long Branch Fabric-Marked.	Impressed by a textile	3b	143		1	67		266		363	1				215	225	45	175	91			1, 592
	Wright Check Stamped	Checker or grid stamped rectangular.	3c	3			19		12		4			83	2	672	73	2	203	3	3		1, 079
	Wright Check Stamped	Checker stamp, rhomboidal.	3d	1			3		32		278	4				669	47			5		1	1, 040
	Bluff Creek Simple Stamped.	Grooved paddle stamped.	3e								71					204	2			3			280
	Pickwick Complicated Stamped.	Curvilinear design by a carved paddle.	3f						1		14					221	3		45				284
		Incised lines, rectilinear or haphazard.	3g	1					9							3			5				18
		Cord wrapped paddled	3h	1					10		33								15				59

[1] S. M.=shell mound; E. M.=earth mound; Cop.=Copena.

[2] No type names were given to sherd groups occurring in small numbers within the Basin nor to groups not considered characteristic of the area.

TABLE 1.—*Sherd distribution*—Continued

Temper	Type name	Surface finish and decoration or type criterion	Type symbol	Site																			Type totals
				Ct° 27 S. M.[1]	Ct° 34 S. M.	Ct° 42 Cave	Lu° 5 S. M.	Lu° 21 E. M.[1]	Lu° 25 S. M.	Lu° 54 Cop[1]	Lu° 59 S. M.	Lu° 61 S. M.	Luᵛ 62 S. M.	Lu° 63 Cop.	Lu° 64 Cop.	Luᵛ 65 Cop.	Lu° 67 S. M.	Lu° 72 S. M.	Luᵛ 92 Village	Hn° 1 E. M.	Hn° 4 Cop.	Hn° 49 Cop.	
Clay grit	McKelvey Plain	Smoothed	4a	417		2	12	19	72		288	10	37			48	91		6,120	12,496			19,612
	Mulberry Creek Cord-Marked.	Cord wrapped paddled	4b	127			7		4		162	3					194		2,978	1,147			4,622
	Wheeler Check Stamped.	Checker or grid stamped, rhomboidal.	4d	164		1		4	12		39	2	5						2,951	6,088			9,266
		Checker or grid stamped, rectangular.	4e	108			1		14		33	2											158
		Punctations within incised lines.	4c						3								1		11	11			26
		Cords impressed in designs.	4f						3		14								24				41
		Incised with lines, usually parallel to lip.	4h	5							3								61	13			82
Shell[2]		Smoothed	5a	81	42	2		755			416	24					154		285	598			2,357
		Cord-wrapped paddled	5b										5				1		2	1			9
		Textile impressed	5c	2													1		3				6
		Incised lines	5d					1												6			7
		Punctate	5e					1			1									1			3
Total[3]				1,195	57	15	193	788	1,543	2	4,816	98	60	143	2	4,094	997	120	13,262	20,575	5	1	47,966

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[1] See footnote 1, p. 525.

[2] See footnote 2, p. 525.

[3] Total numbers do not always mean total number for a site as the usual procedure was to select certain cuts. When checked these selections are porportional to total number per site.

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  Lu° 61 skeletons. *See* Skeletal data: separate Shell Mound series.
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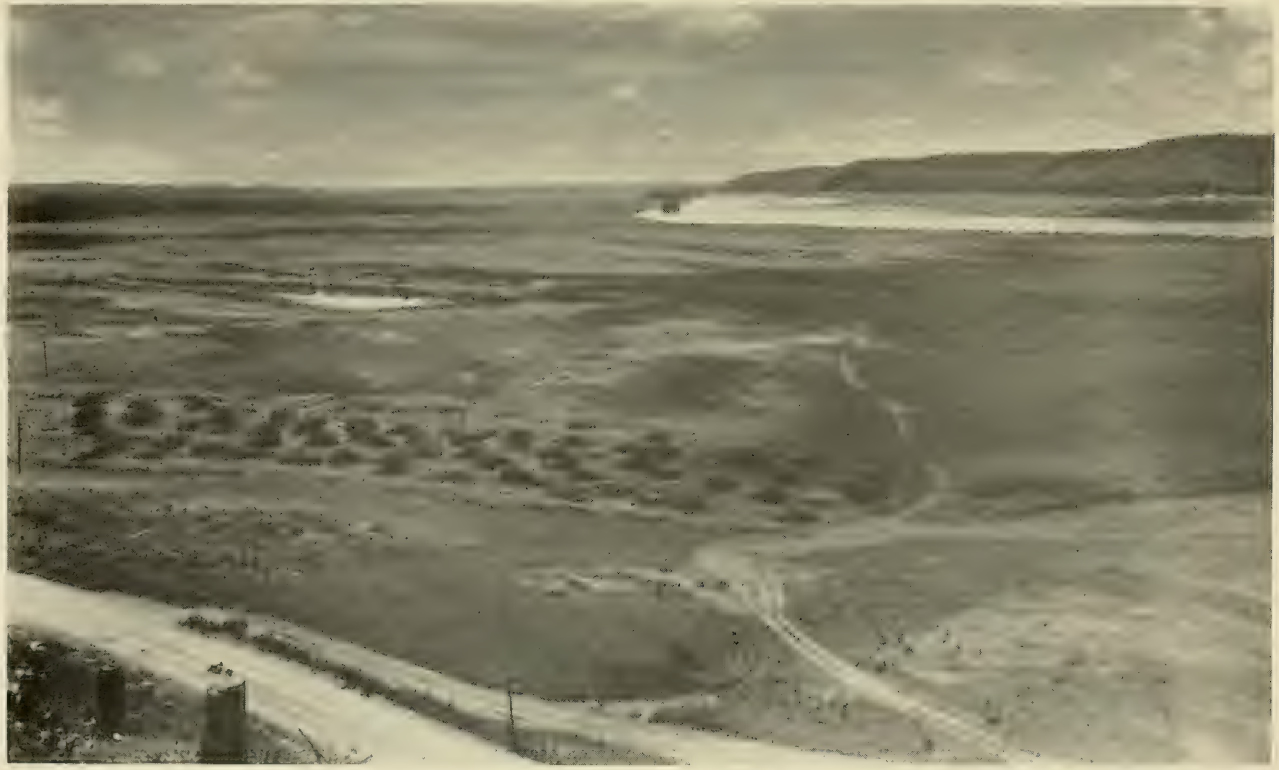
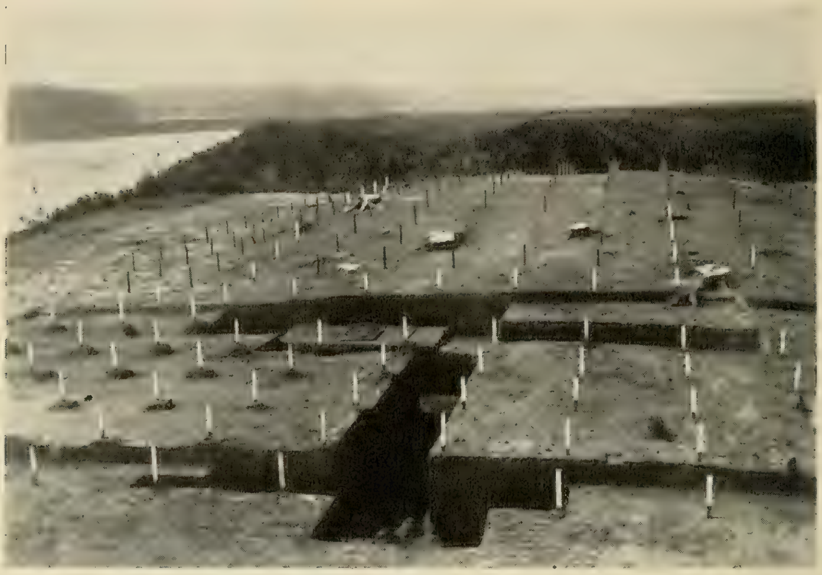
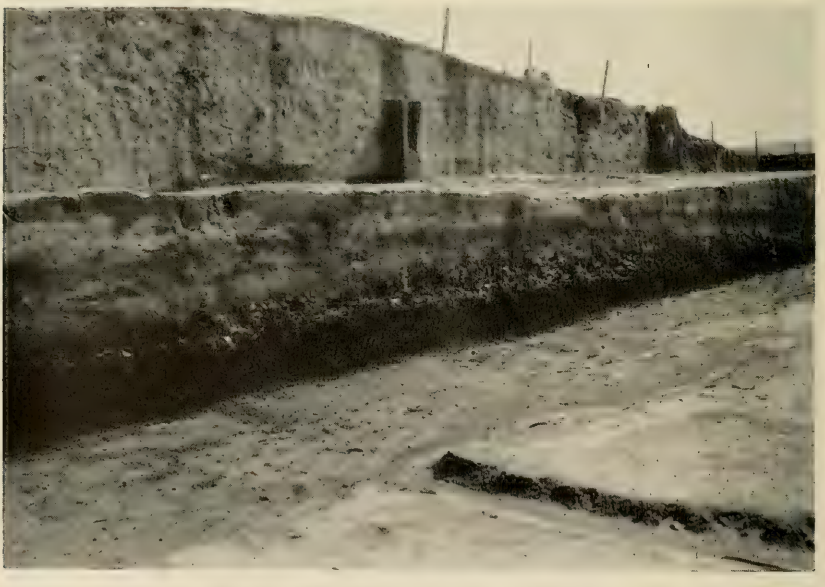


In Pickwick Basin Looking up the River Above Waterloo, Ala.; Brush Creek Island in Central Foreground.

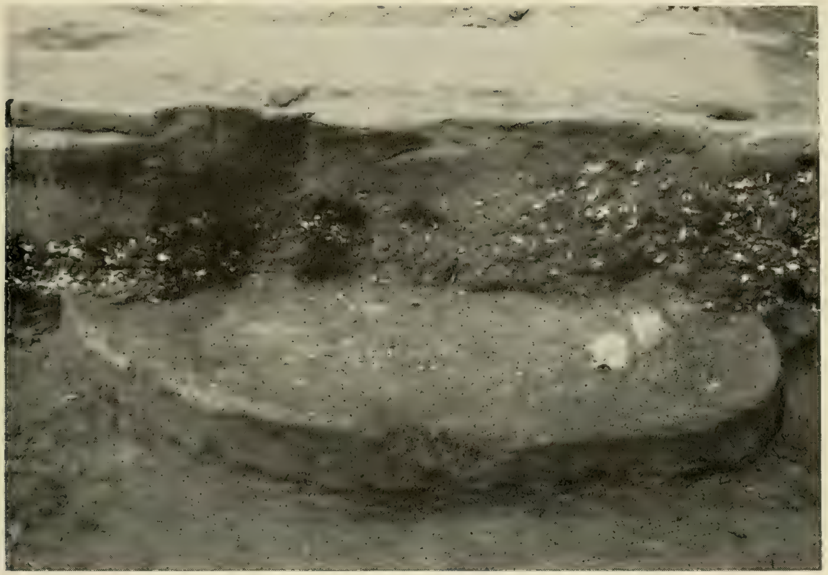
Photographed after clearing basin of timber. Note 418-foot contour—the basin edge as shown by timber line on distant hills.



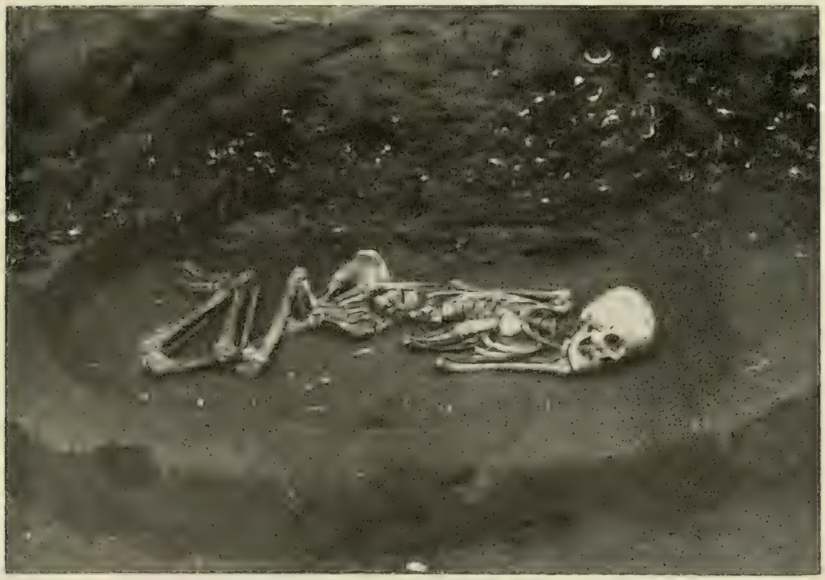
1. LOOKING NORTHWEST, DOWNSTREAM. SITE STAKED. OPEN TRENCHES IN FOREGROUND. SITE HN° 1.



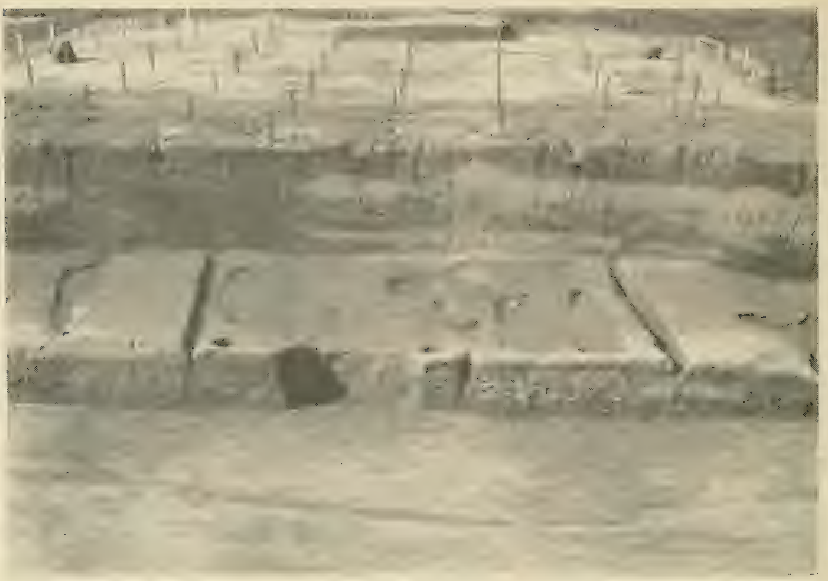
2. THE 35-FOOT PROFILE, SHOWING BASIC SHELL MIDDEN. SITE HN° 1.



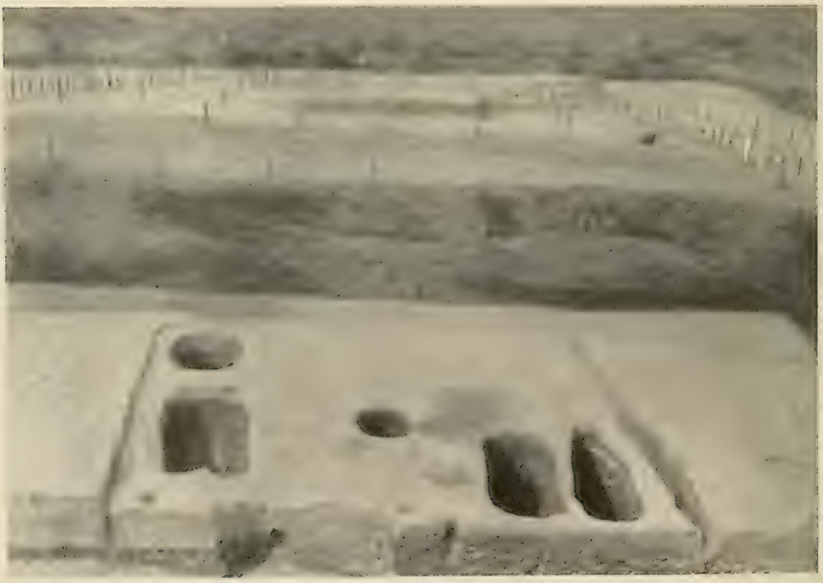
1. Burial Fit No. 5 Before Opening. Site Hn° 1.



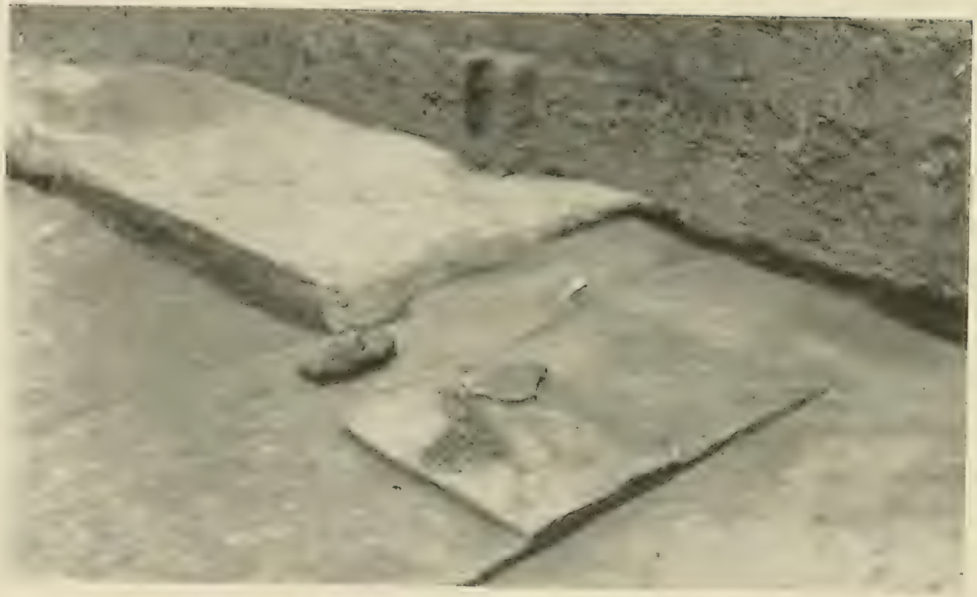
2. Burial No. 5 in Pit No. 5. Site Hn° 1.



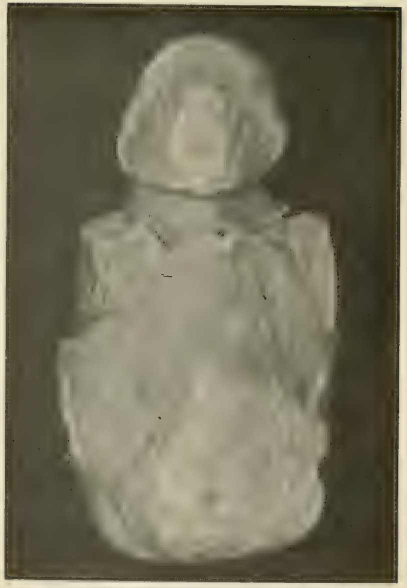
1. CLAY FLOOR NO. 1 WITH BURIAL PITS NOS. 6, 7, 8, 9, AND 11. POSTMOLDS AND WALL TRENCHES EXPOSED BETWEEN 40- AND 50-FOOT PROFILES. FEATURE NO. 20. SITE HNº 1.



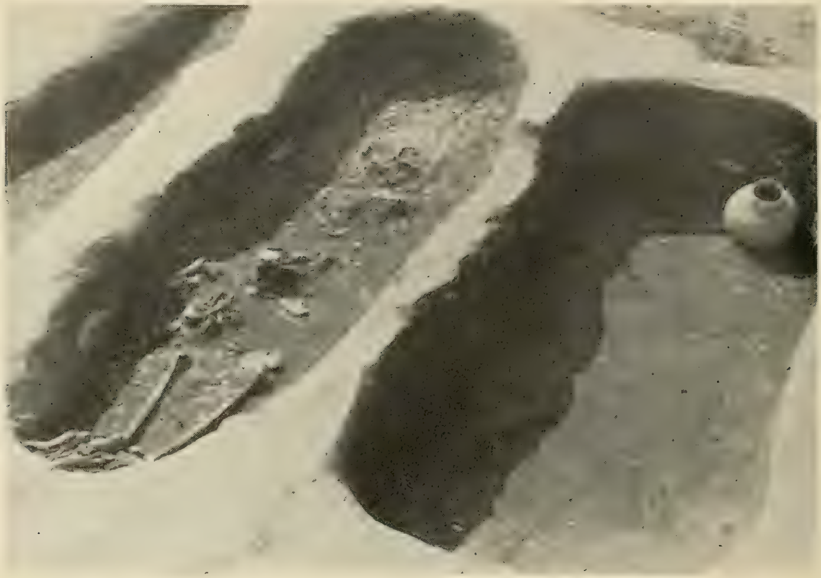
2. PITS OPENED IN FLOOR OF STRUCTURE NO. 1. SITE HNº 1.



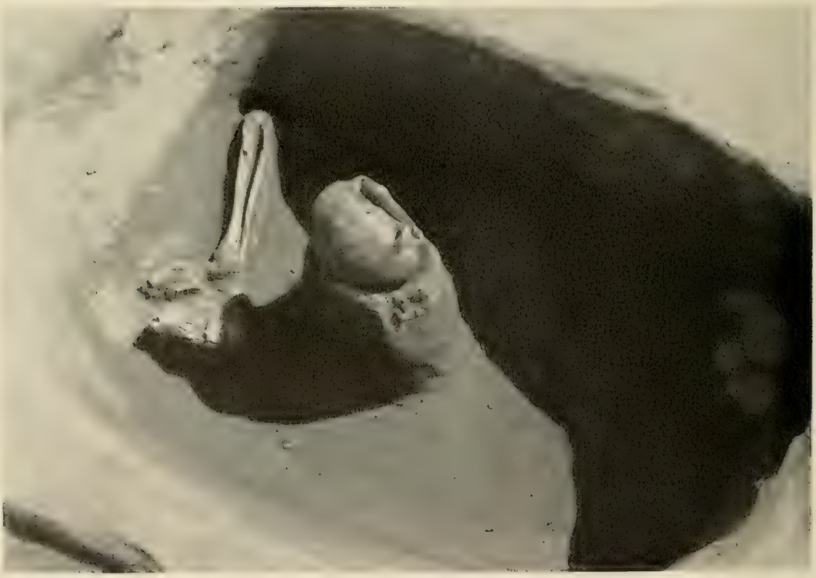
1. SANDSTONE EFFIGY IN SITU. SITE HNo 1.



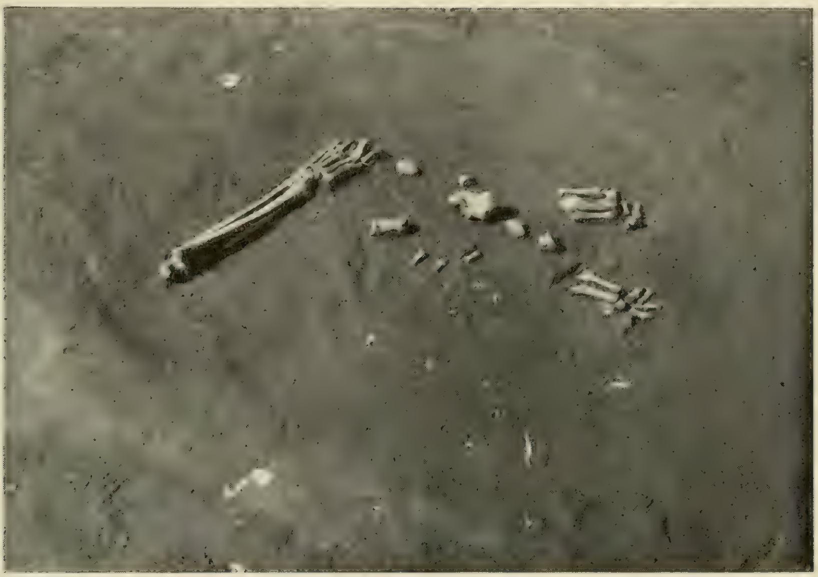
2. SANDSTONE EFFIGY. SITE HNo 1.



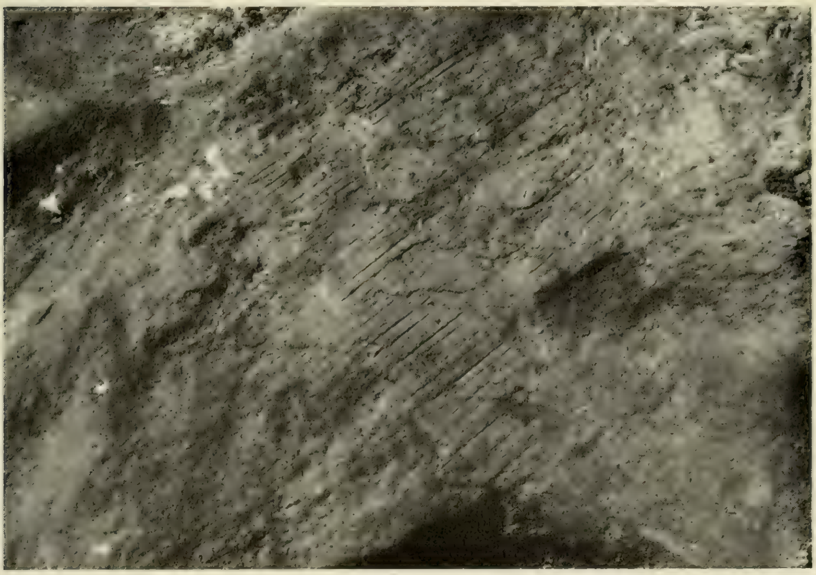
1. BURIAL NO. 9 IN PIT NO. 9; PIT NO. 8 EMPTY. SITE HNº 1.



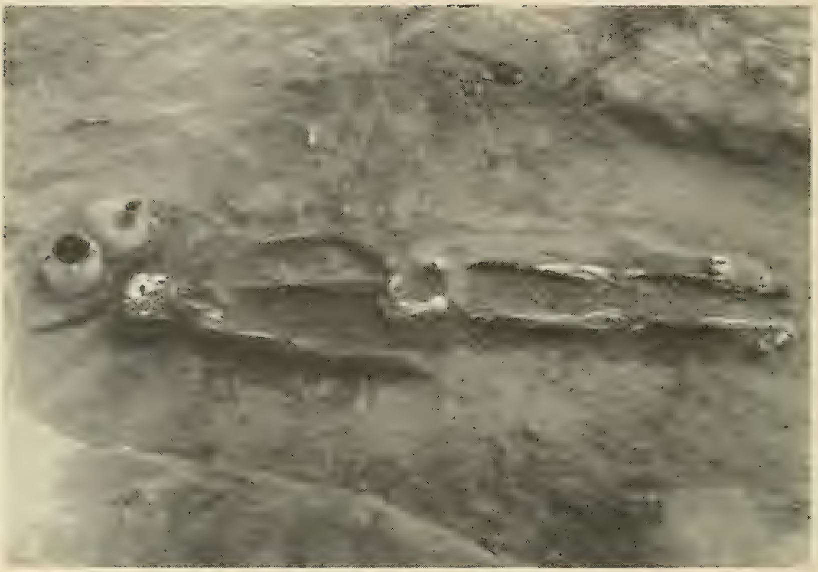
2. BURIAL NO. 10 IN PIT NO. 10. SITE HNº 1.



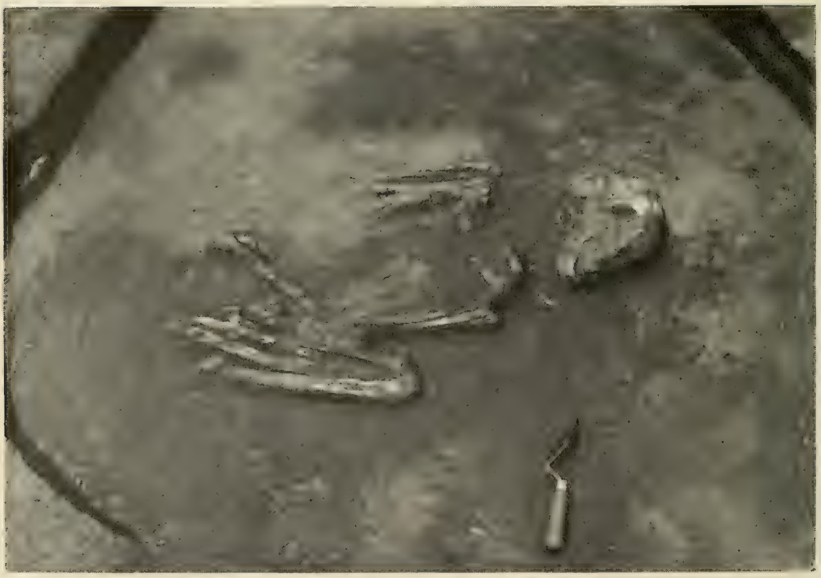
1. Remains of Burial No. 11. Site Hn° 1.



2. Split-Cane Impressions on Clay Floor of Structure No. 1. Site Hn° 1.



1. BURIAL NO. 2 (EXTENDED). SITE HN° 1.

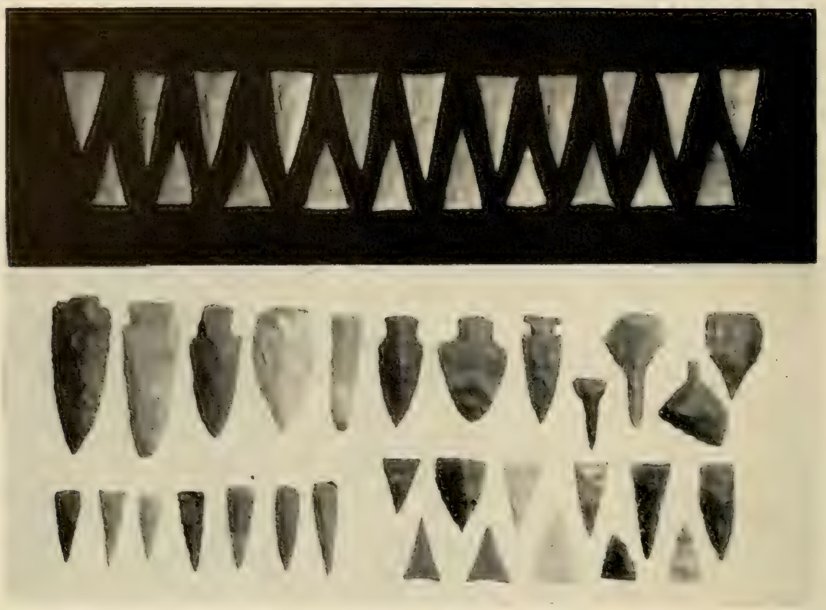


2. BURIAL NO. 4 (FULLY FLEXED). SITE HN° 1.

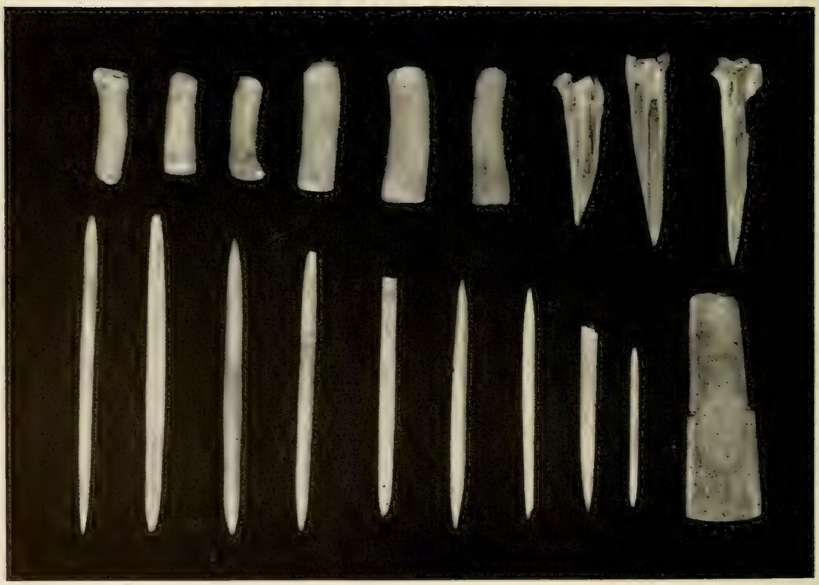
1. THE 55-FOOT PROFILE. SITE HNo 1.

2. LOWER PART OF 55-FOOT PROFILE AND UPPER PART OF 60-FOOT PROFILE. SITE HNo 1.

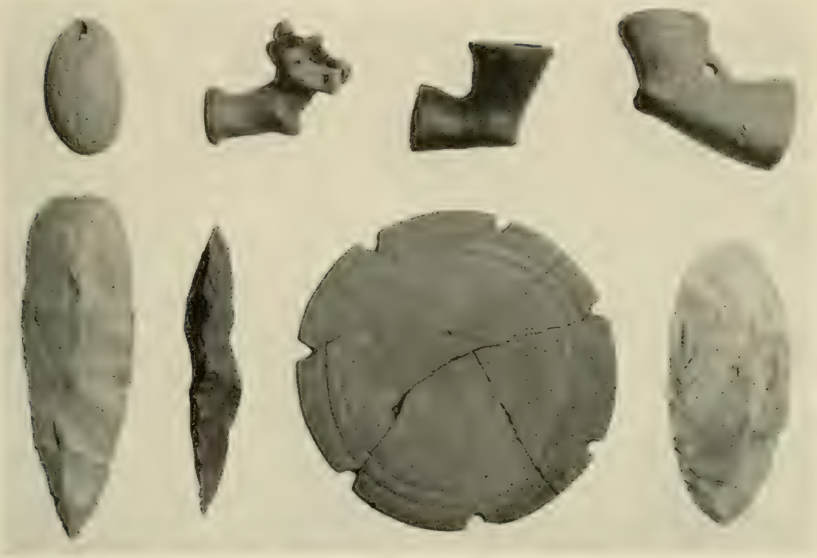
3. FLOOR NO. 2 EXPOSED BETWEEN 60-FOOT AND 75-FOOT PROFILE. SITE HNo 1.



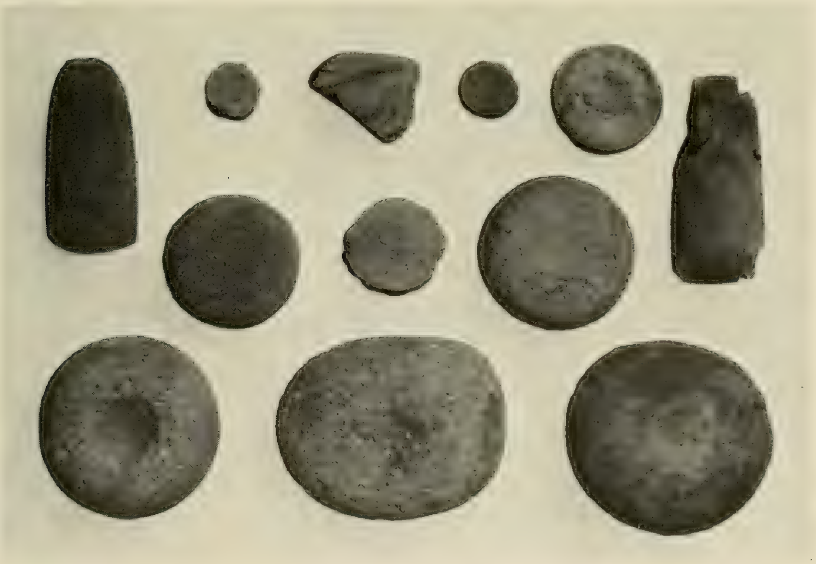
1. Flint Projectile Points. Site Hn° 1.



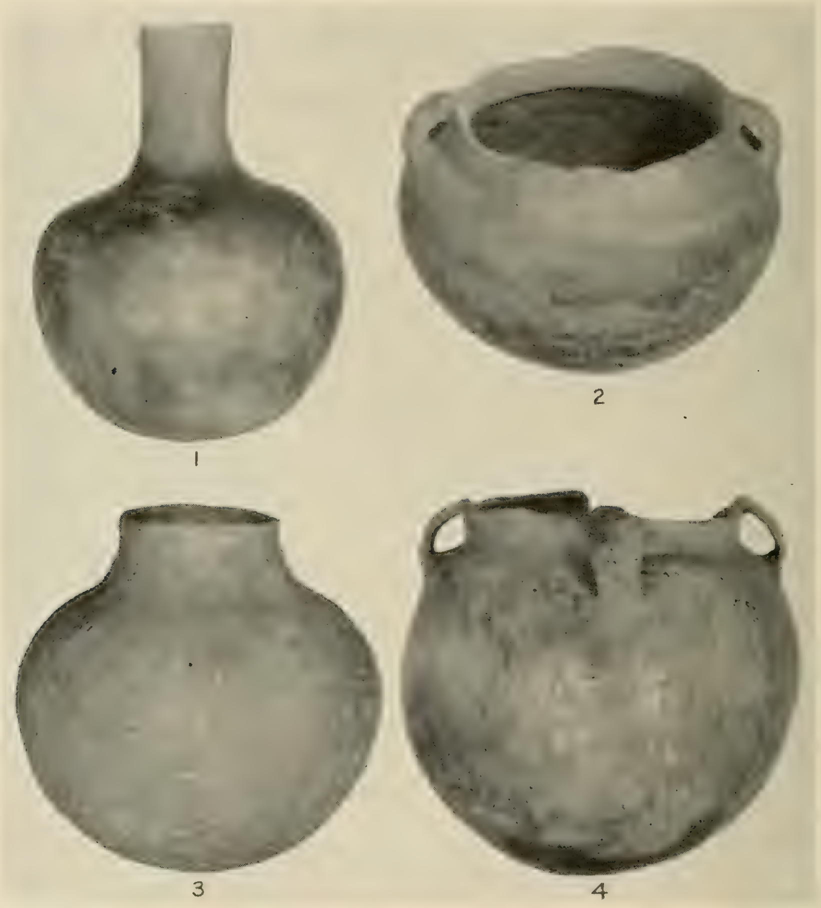
2. Bone and Antler Artifacts. Site Hn° 1.



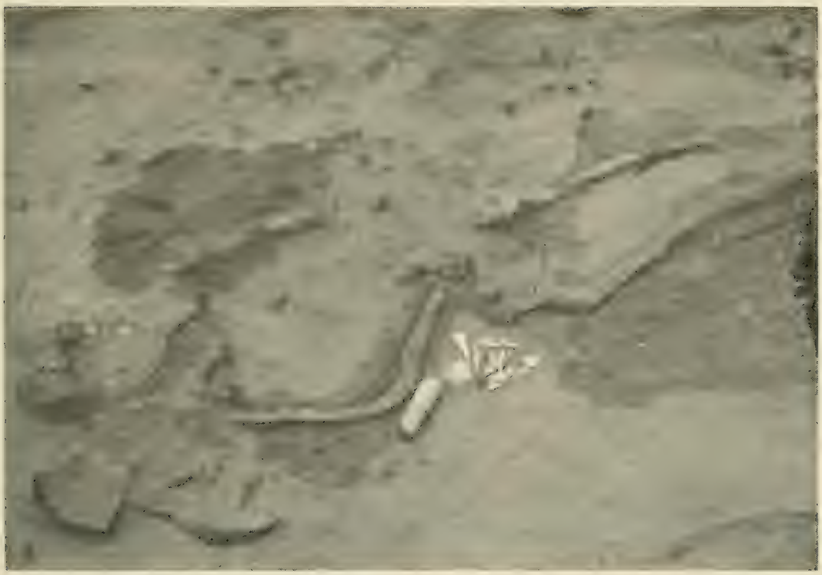
1. PIPES, PENDANT, SANDSTONE DISK, AND FLINT KNIVES. SITE HN° 1.



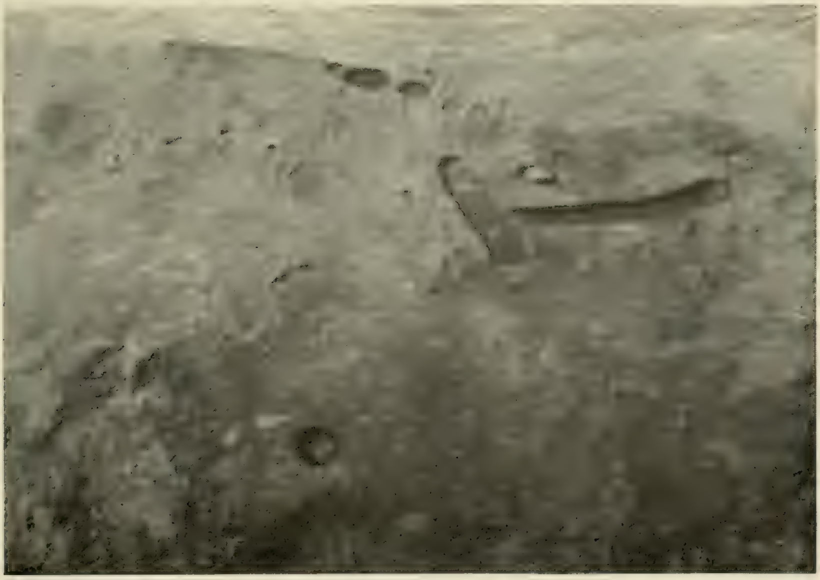
2. HAMMERSTONES, DISCOIDALS, CELTS, AND WHETSTONES. SITE HN° 1.



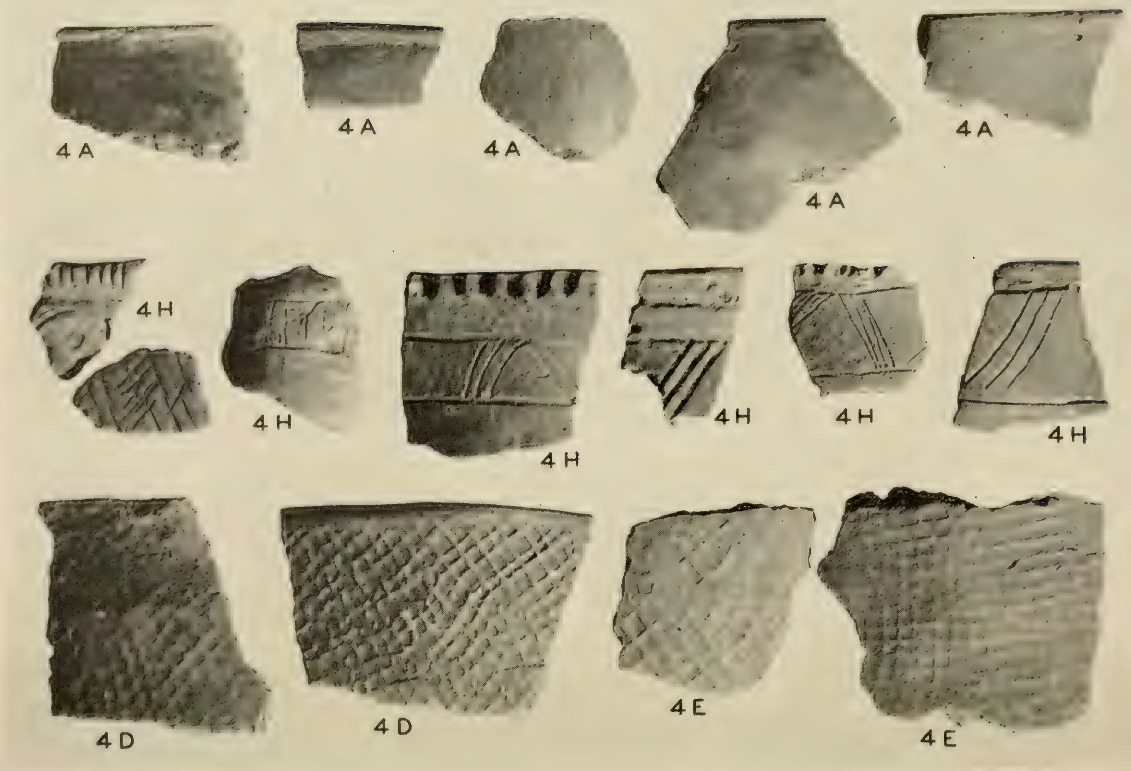
1. Water Bottle, Burial No. 2. 2. Bowl, Pit No. 10, Burial No. 10. 3. Large-Mouth Water Bottle, Pit No. 8. 4. Pot, Four Strap Handles. Site Hn° 1.



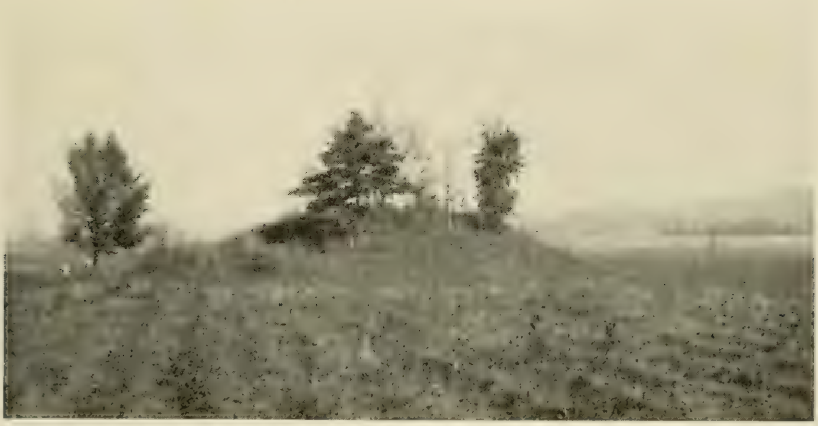
1. BURIAL NO. 16 SHOWING CACHE OF TRIANGULAR POINTS. SITE HN° 1.



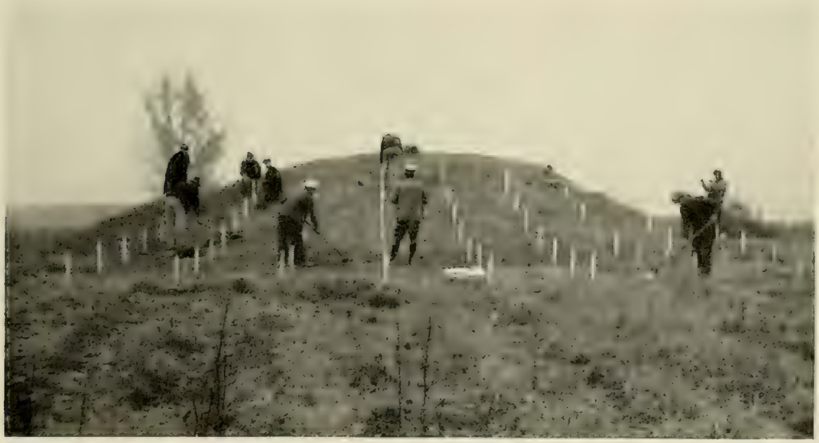
2. FIGURE ON FLOOR OF FEATURE NO. 28. SITE HN° 1.


4 A
4 A
4 A
4 A
4 A
4 H
4 H
4 H
4 H
4 H
4 H
4 D
4 D
4 E
4 E

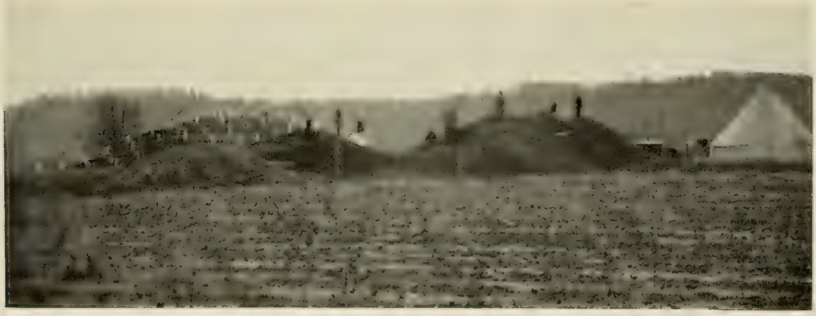
Clay-Grit Tempered Sherds, Site Hn° 1.



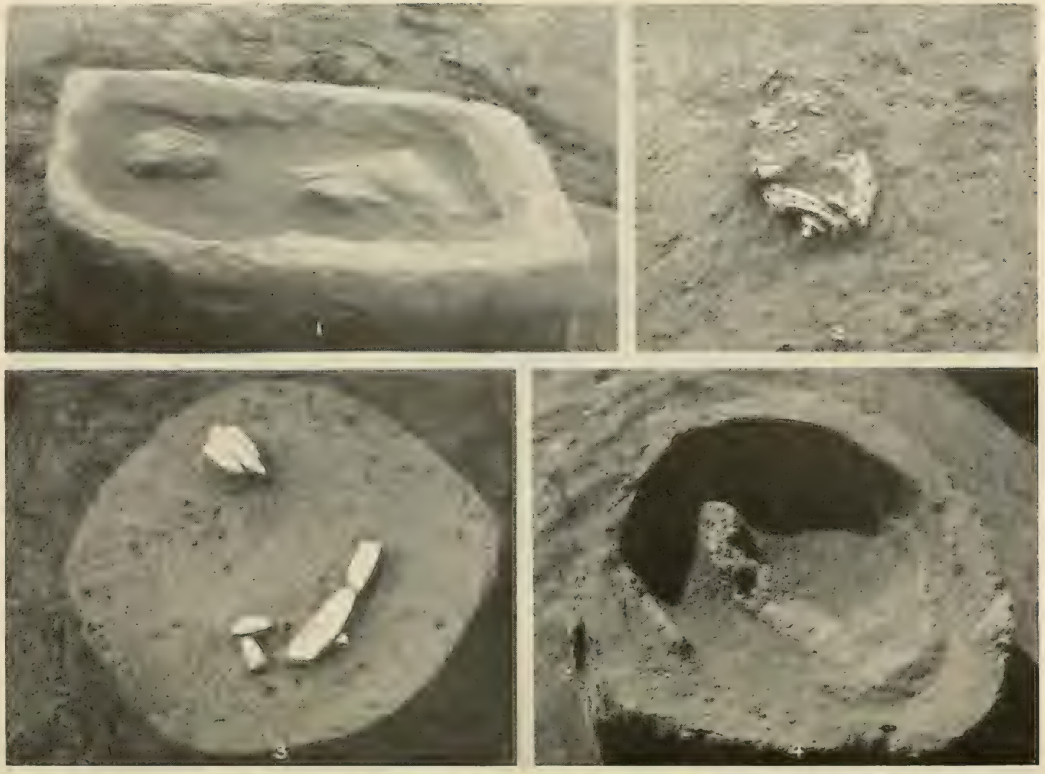
1. MOUND BEFORE CLEARING. SITE HNo 4.



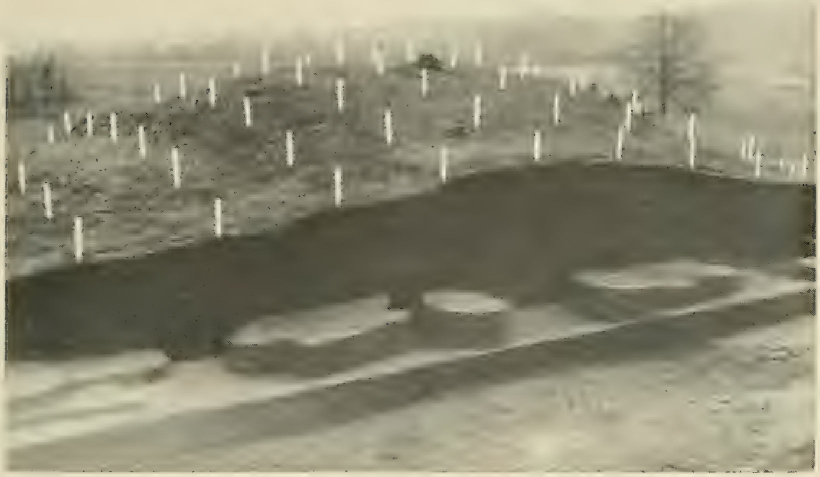
2. STAKING THE MOUND FOR EXCAVATION. SITE HNo 4.



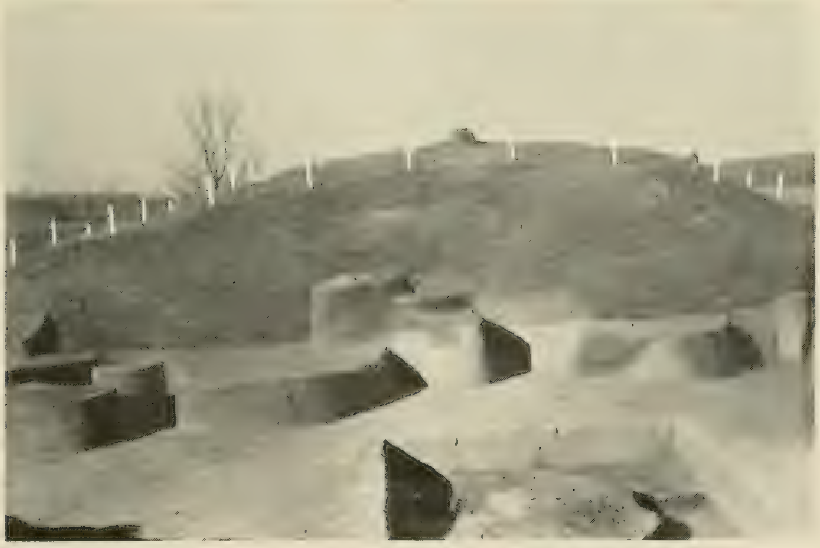
3. THE SITE LOOKING EASTWARD. SITE HNo 4.



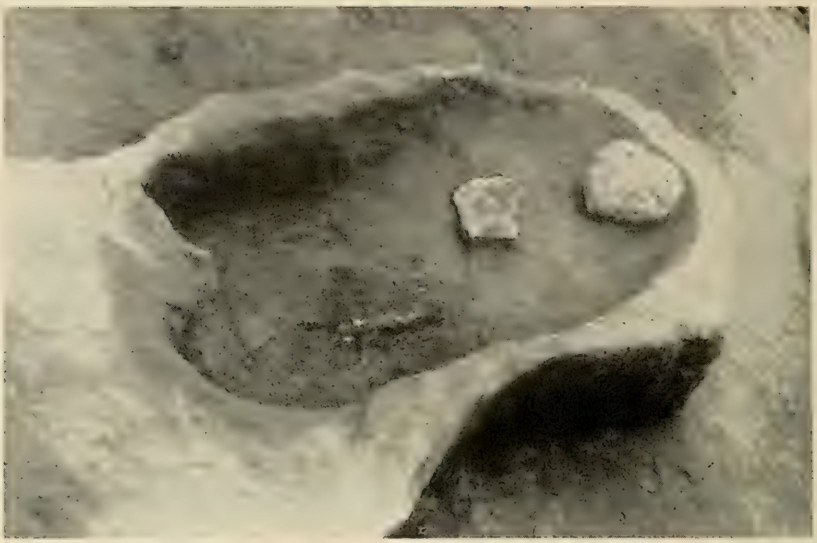
1. BURIAL NO. 57. 2. CHILD BURIAL ON CONCH SHELL. 3. FEATURE NO. 1, FLINT CACHE. 4. BURIAL NO. 20. SITE HNº 4.



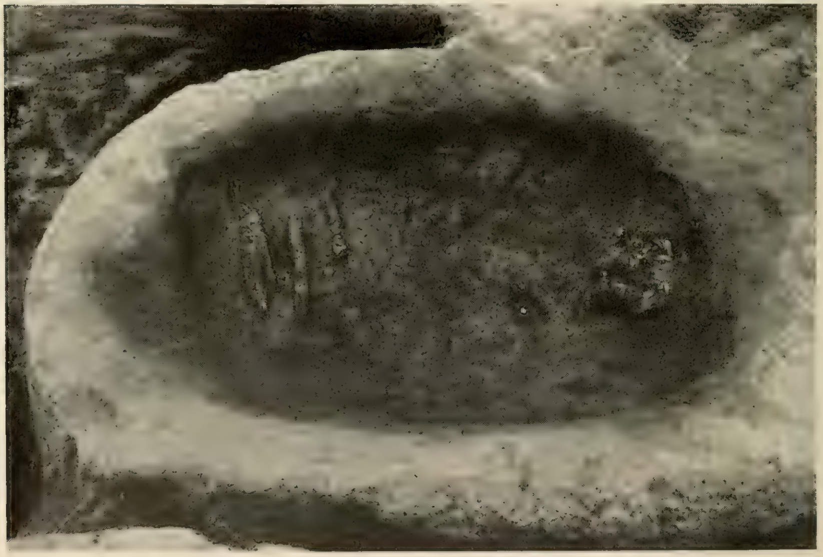
1. UNOPENED PITS IN 25-FOOT CUT. SITE HNo 4.



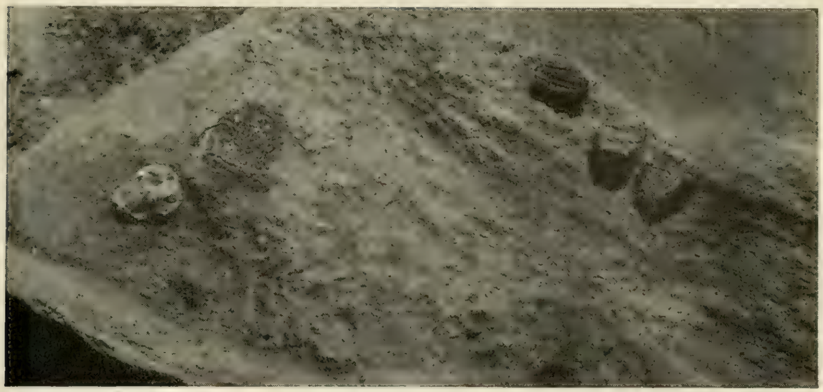
2. 35-FOOT PROFILE AND PITS, LOOKING NORTH. SITE HNo 4.



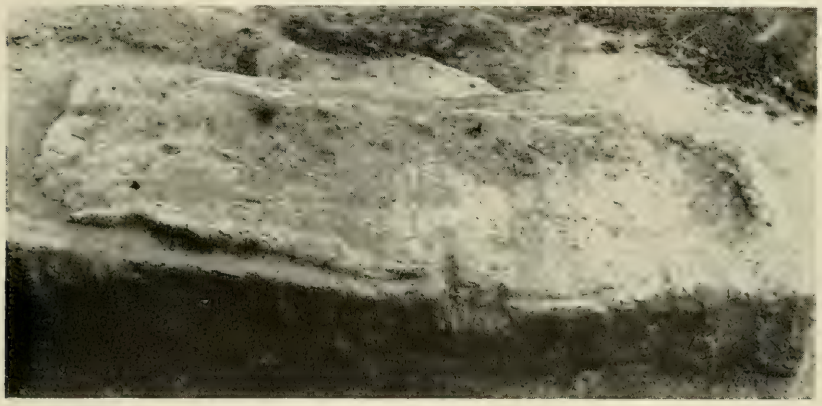
1. BURIAL NO. 55, CHARCOAL AND GALENA. SITE HNº 4.



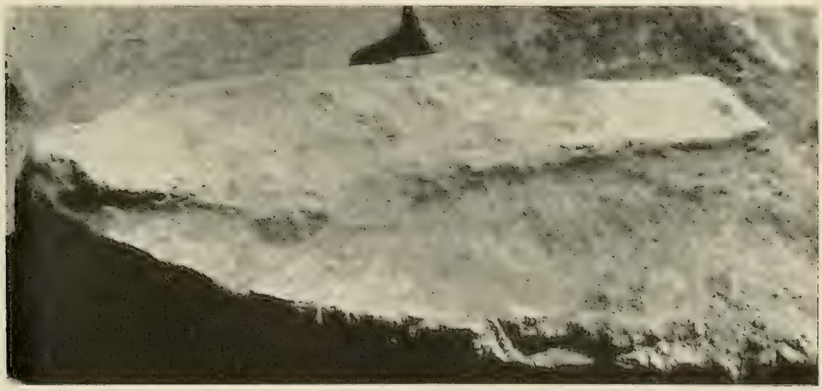
2. BURIAL NO. 63, PARTIALLY FLEXED. SITE HNº 4.



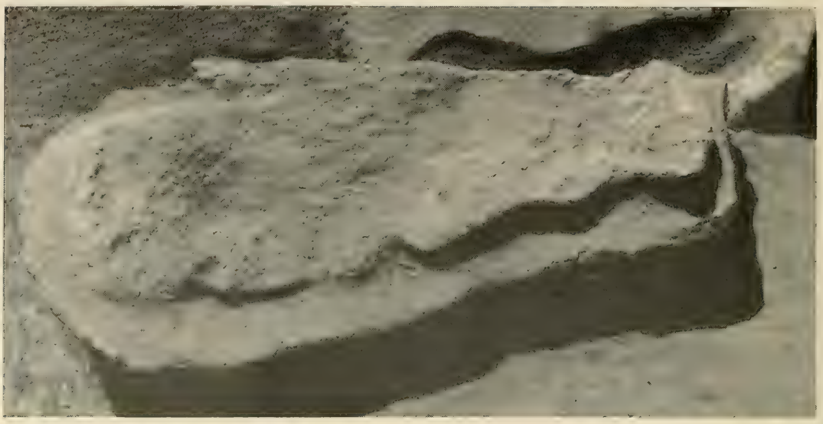
1. BURIAL NO. 21. NOTE GALENA BALL. COPPER BEADS AND CANE IMPRESSIONS IN PUDDLED CLAY. SITE HNo 4.



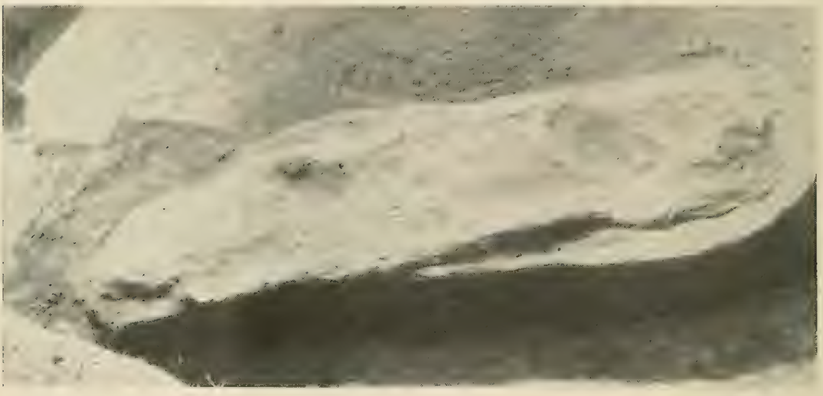
2. BURIAL NO. 50; PUDDLED CLAY BEFORE UNCOVERING. SITE HNo 4.



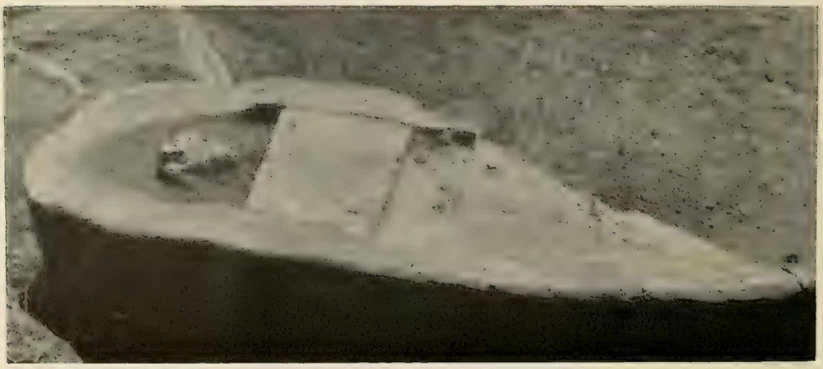
3. BURIAL NO. 61; BEFORE REMOVAL OF PUDDLED CLAY. SITE HNo 4.



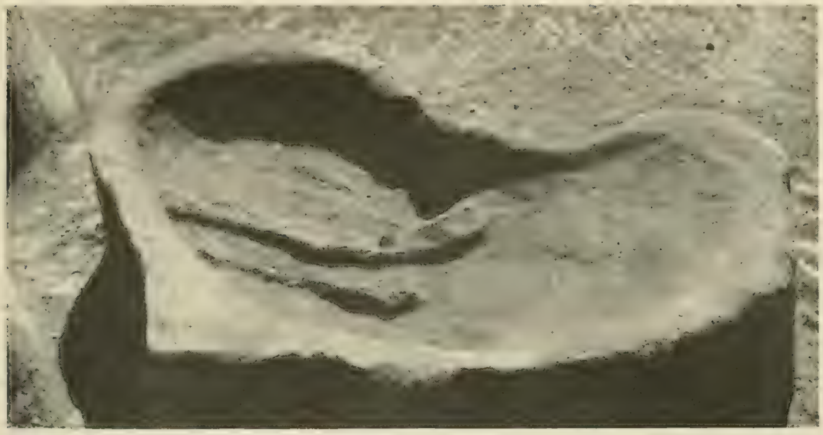
1. Burials Nos. 28, 29; Puddled Clay. Site Hn° 4.



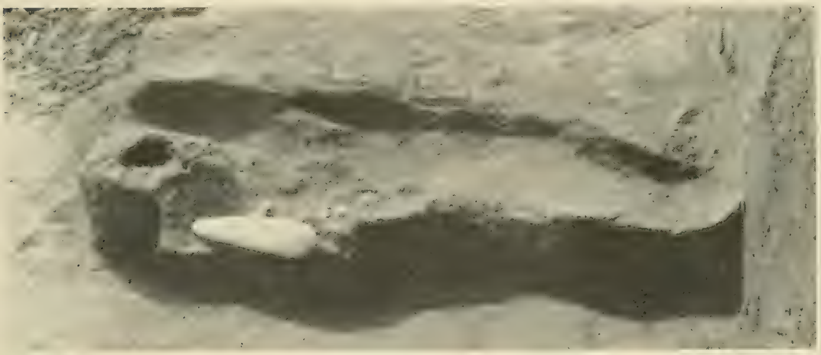
2. Burial No. 27; Puddled Clay. Site Hn° 4.



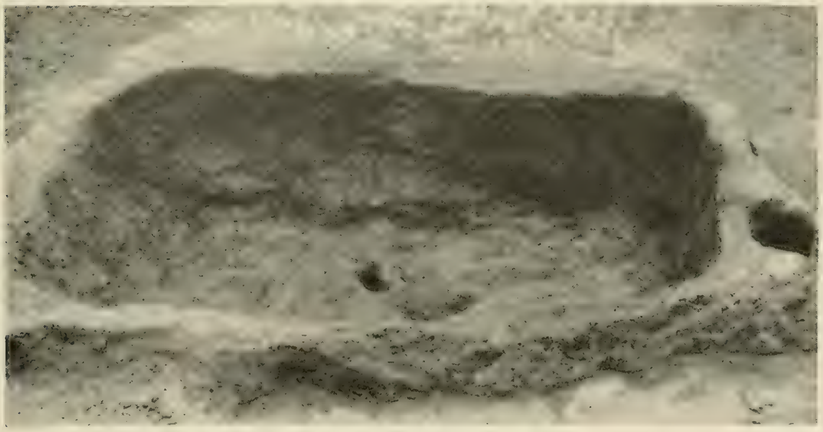
3. Burial No. 18, Puddled Clay Partly Removed. Site Hn° 4.



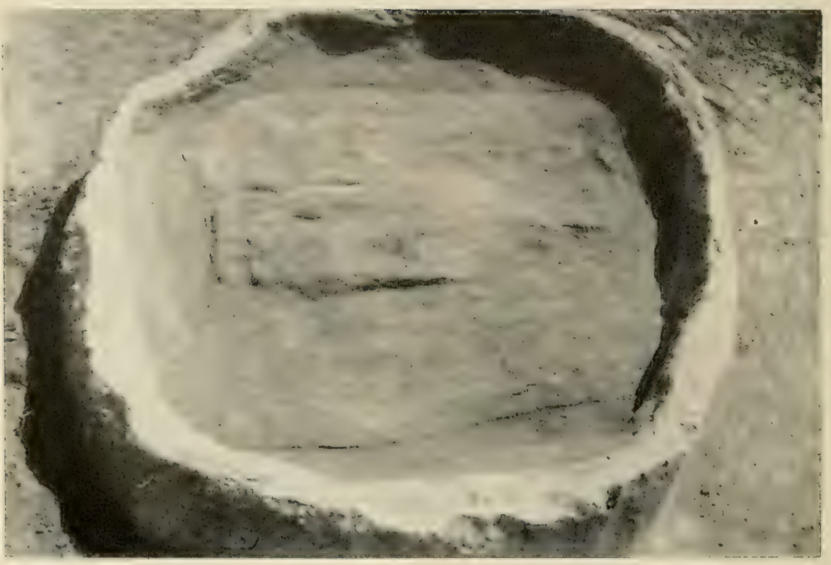
1. PIT NO. 35, FEATURE NO. 18. SITE HN° 4.



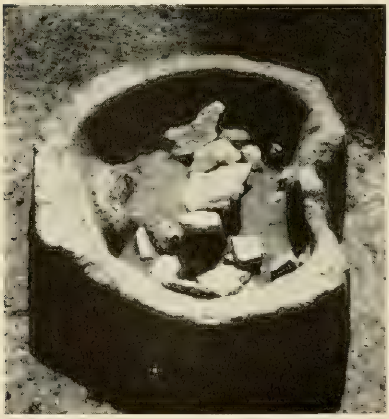
2. BURIAL NO. 36 IN SECTION OF CLAY 0.2 FOOT THICK. SITE HN° 4.



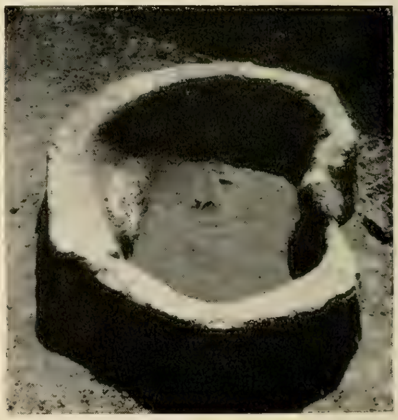
3. PIT NO. 83, FEATURE NO. 26. NOTE POST MOLD AT END OF PIT. SITE HN° 4.



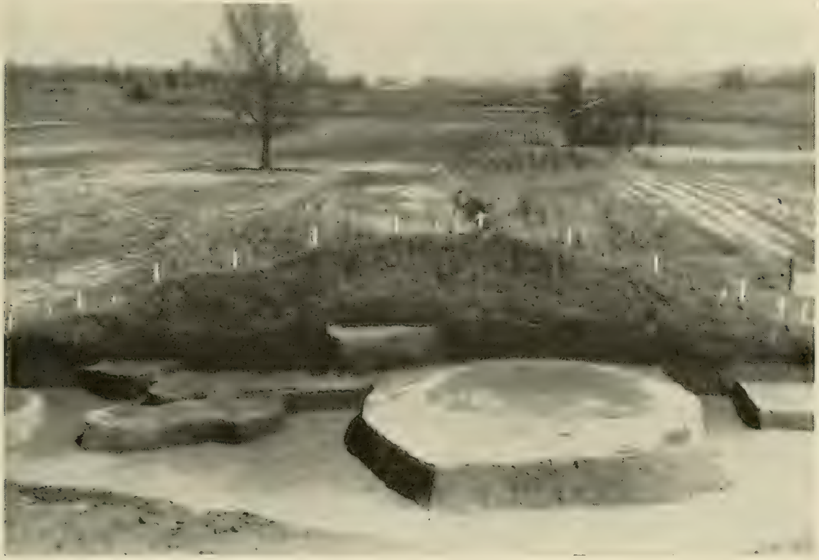
1. BURIALS NOS. 30, 31, AND 32. A TRIPLE CLAY BURIAL IN A SUBSURFACE PIT. SITE HNº 4.



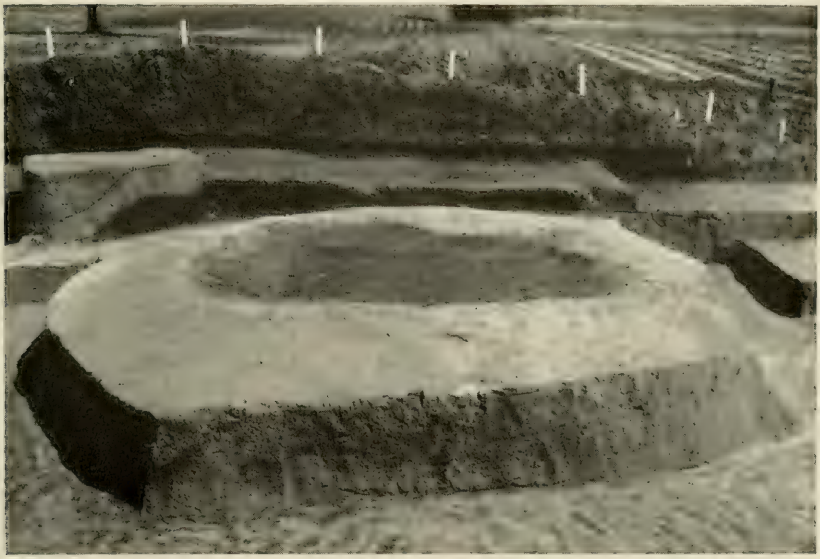
2. BURIAL NO. 60 UNDER ROCKS IN PIT NO. 75. SITE HNº 4.



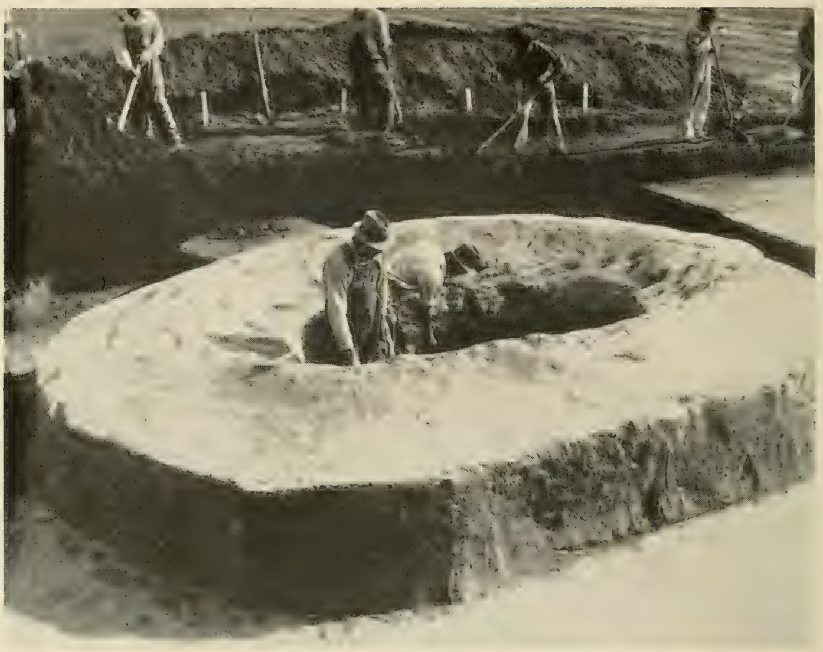
3. BURIAL NO. 60, ROCKS REMOVED. NOTE CHARRED LOG, TOOTH CROWNS. HARD-BURNT PIT BOTTOM. SITE HNº 4.



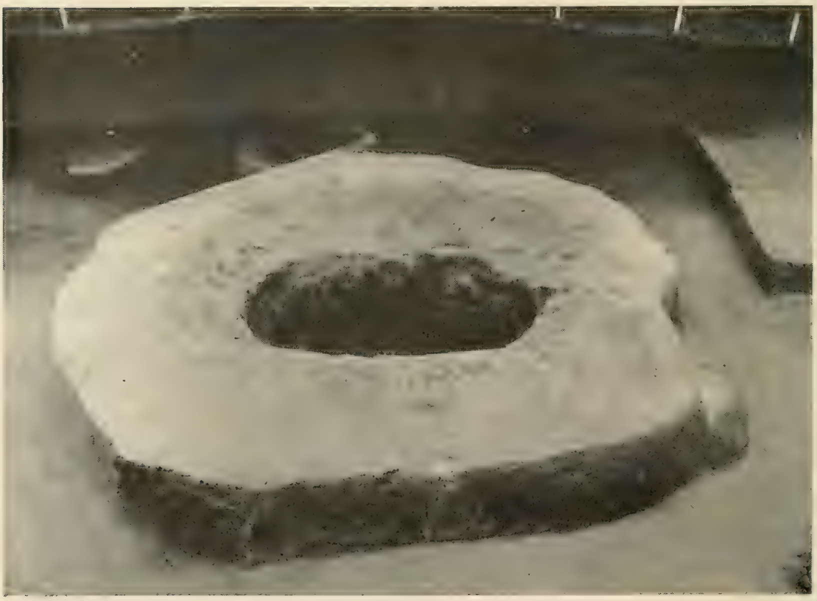
1. 55-FOOT PROFILE FROM SOUTH. SITE HN° 4.



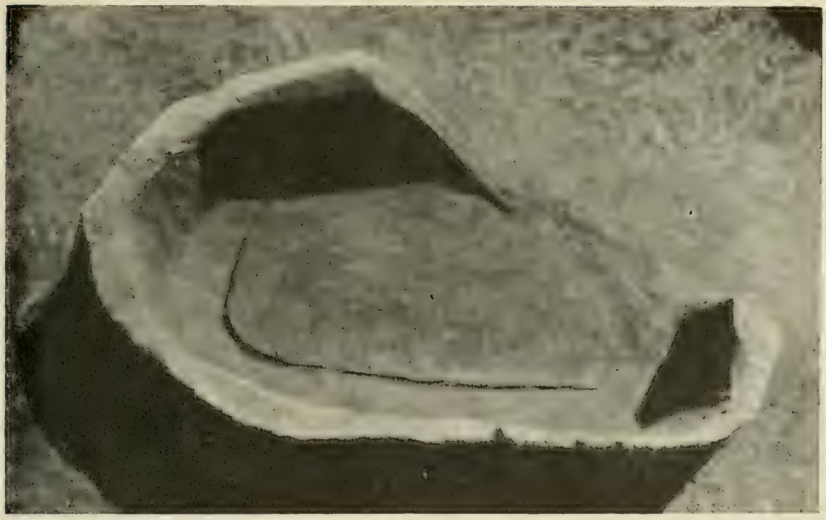
2. EATURE NO. 24; CENTRAL PIT UNOPENED. SITE HN° 4.



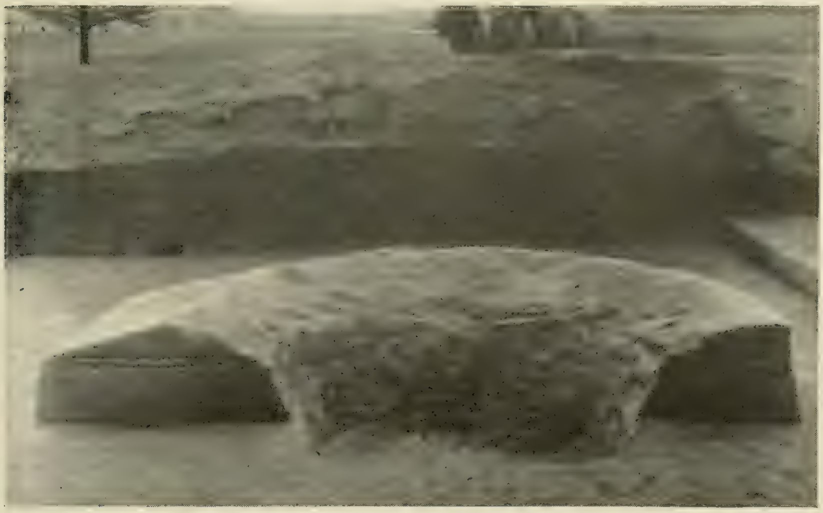
1. FEATURE NO. 24; CLEANING OUT PIT. SITE HNº 4.



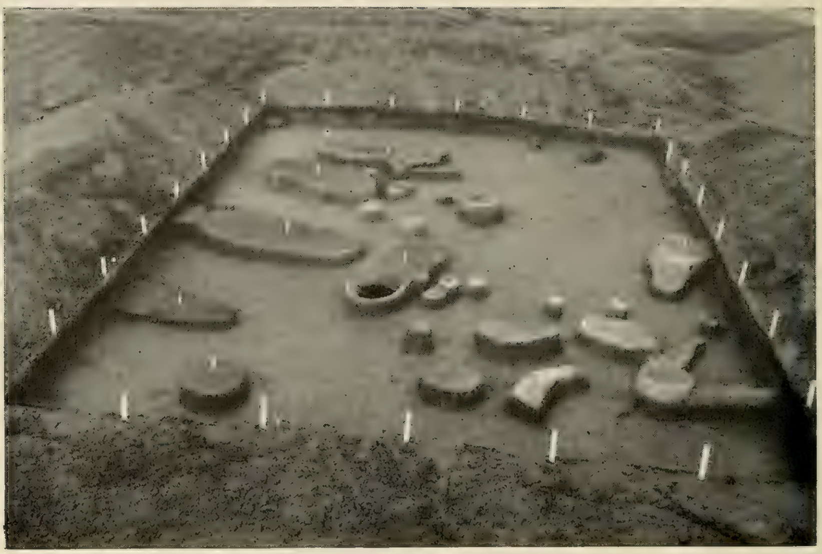
2. FEATURE NO. 24. NOTE MOLDS OF ENDS OF LOGS WHICH ONCE COVERED PIT. SITE HNº 4.



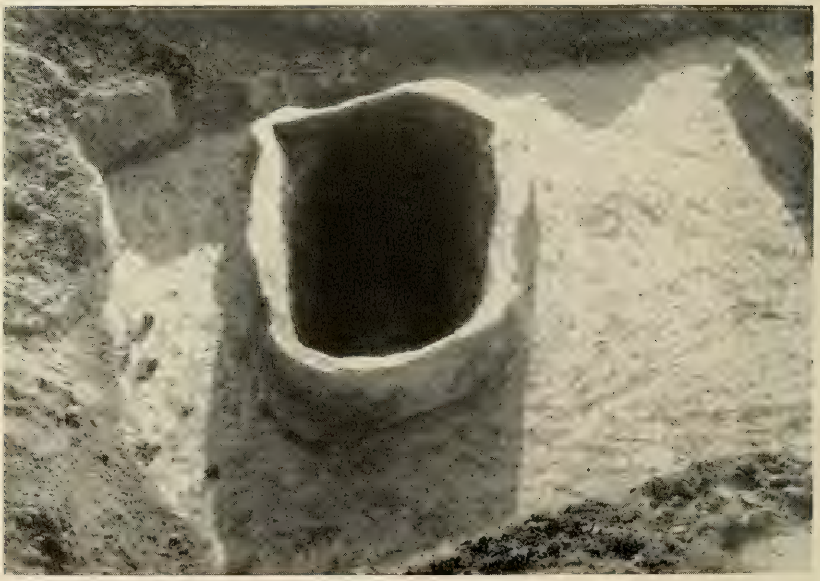
1. FEATURE NO. 19; PUDDLED CLAY BASIN. SIDE REMOVED TO ADMIT LIGHT SITE HNº 4.



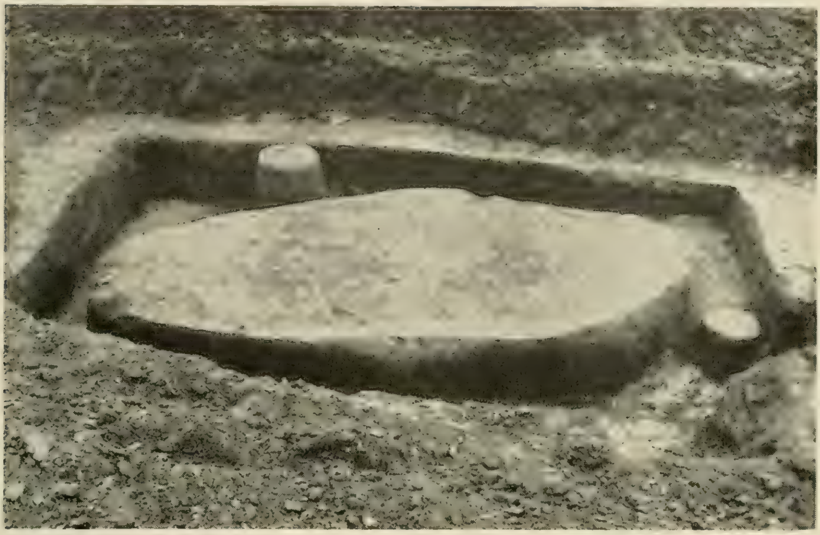
2. CROSS SECTION OF CENTRAL LOG-COVERED PIT. NOTE RED CLAY REMOVED FROM PIT WAS LAID ON PREPARED FLOOR OF GRAY CLAY. SITE HNº 4.



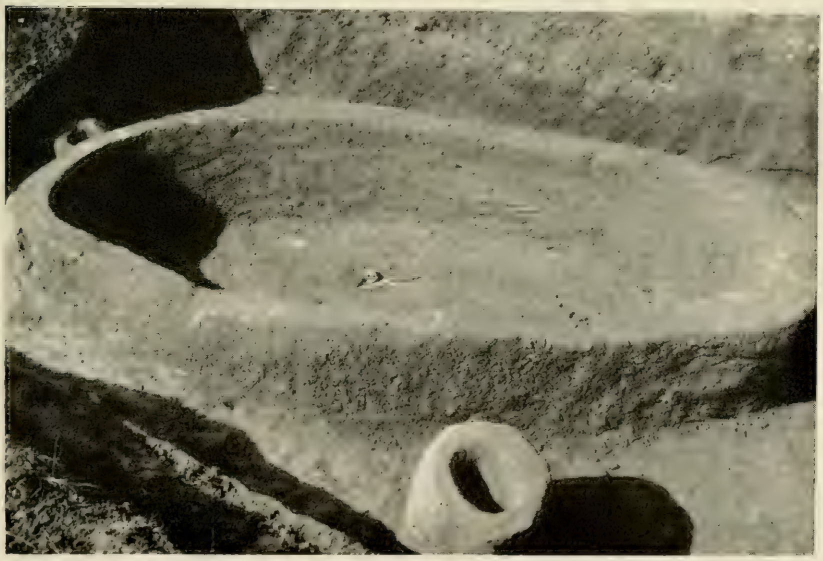
1. PIT AREA HN° 4-X1, SHOWING UNOPENED PITS.



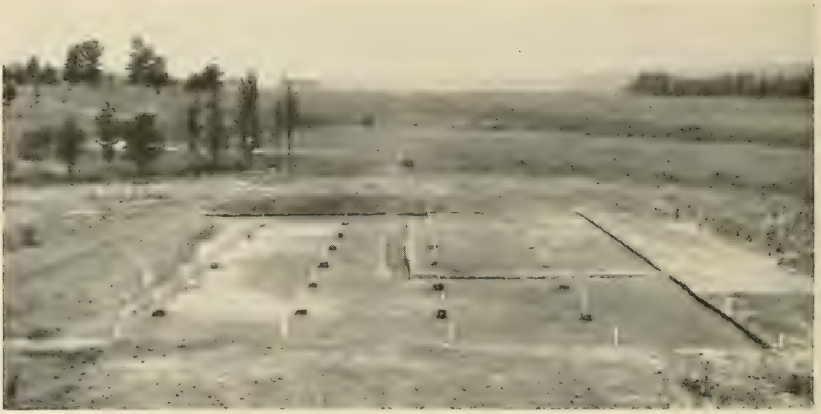
2. PIT NO. 2, OPEN. PIT AREA HN° 4-X1.



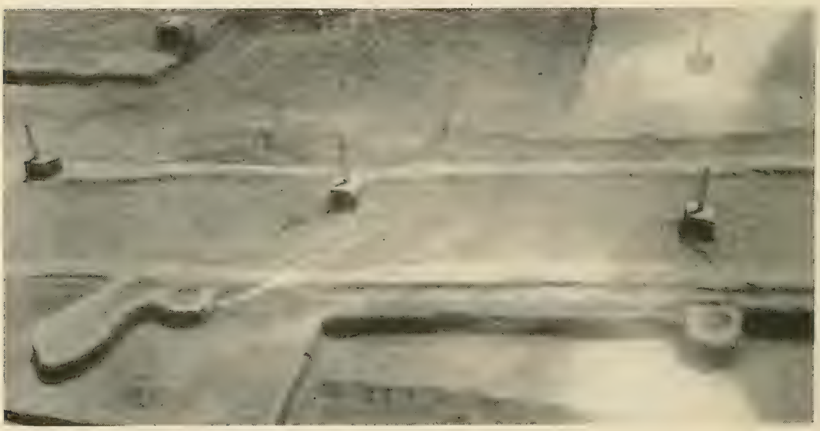
1. PIT AREA HNº 4–X2. PIT NO. 1, UNOPENED.



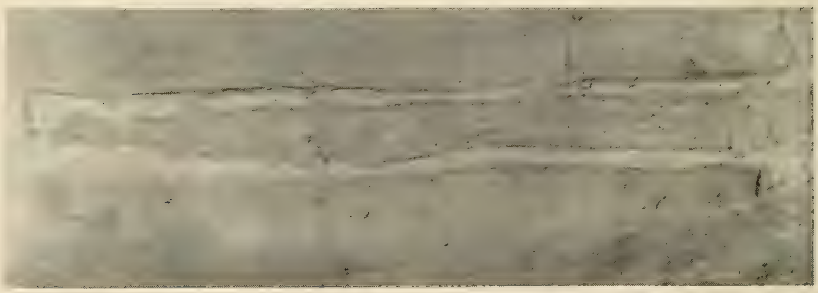
2. PIT NO. 1, PARTLY EXCAVATED. NOTE POST MOLDS AND ARTIFACTS. PIT AREA HNº 4–X2.



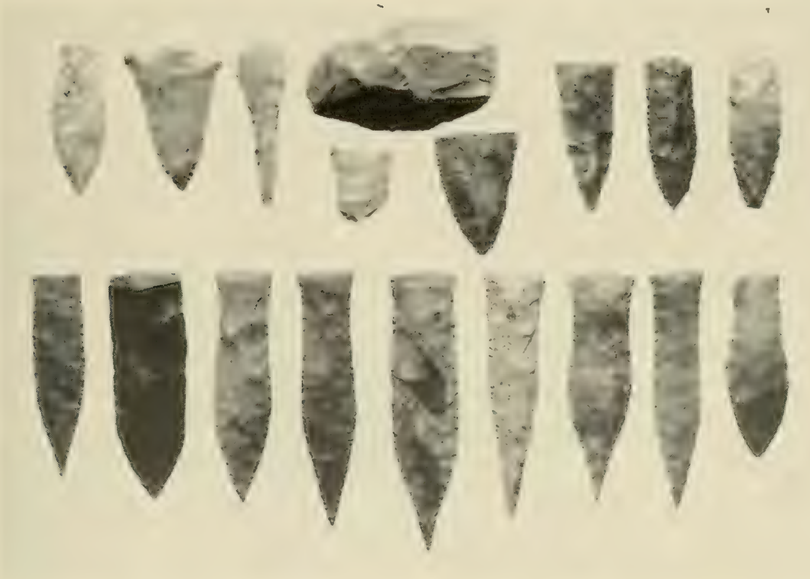
1. PIT AREA HN° 4-X3 FROM THE SOUTH.



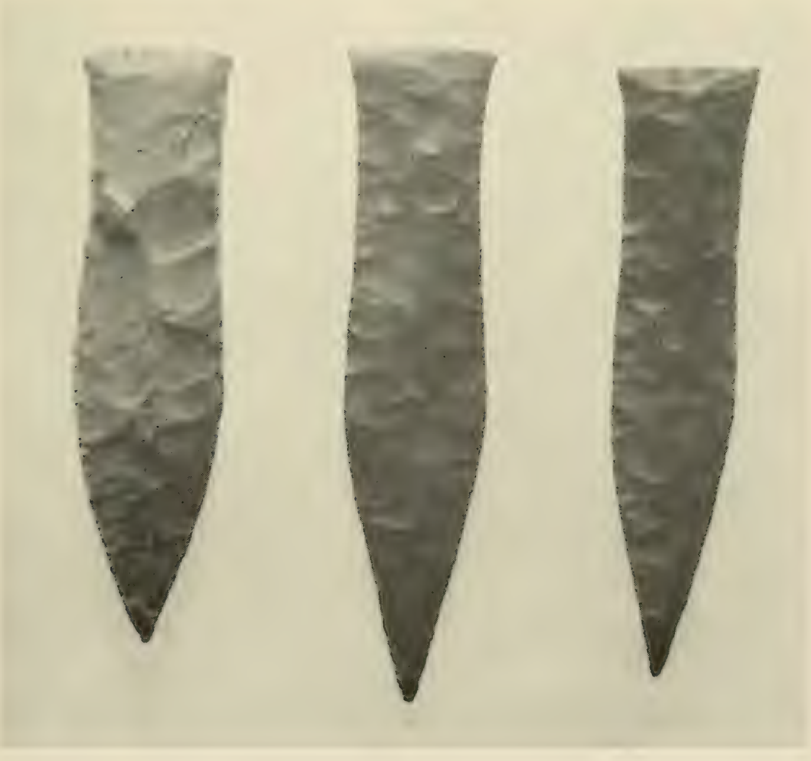
2. PUDDLED CLAY WALL, FEATURE NO. 2. PIT AREA HN° 4-X3.



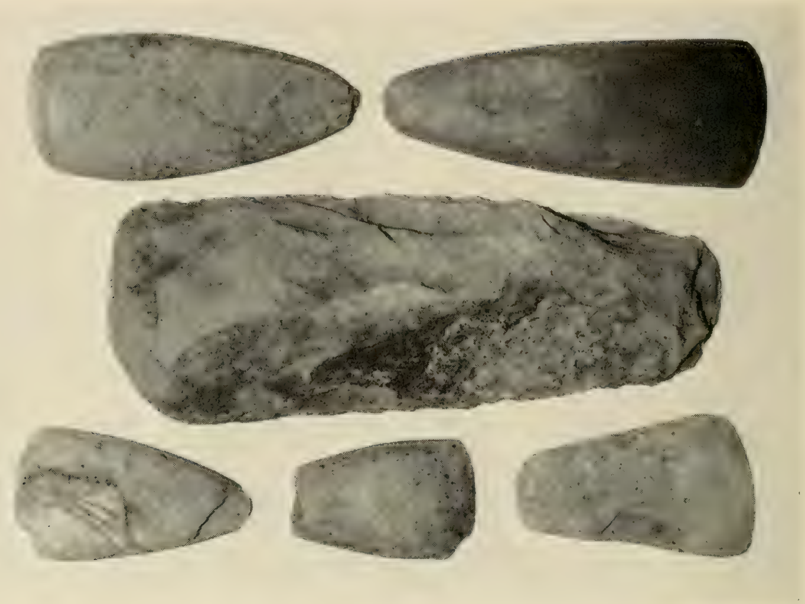
3. CLOSE-UP OF PUDDLED CLAY WALL. PIT AREA HN° 4-X3.



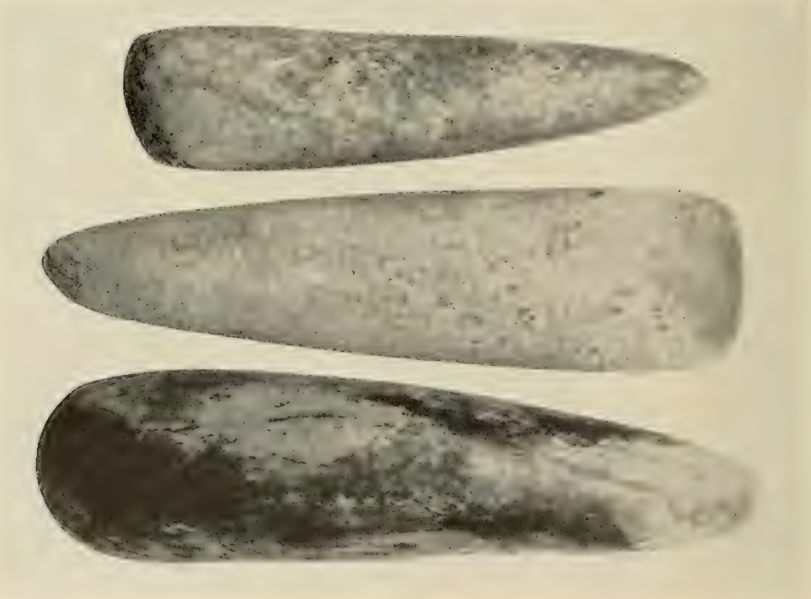
1. FLINT PROJECTILE POINTS. SITE HN° 4.



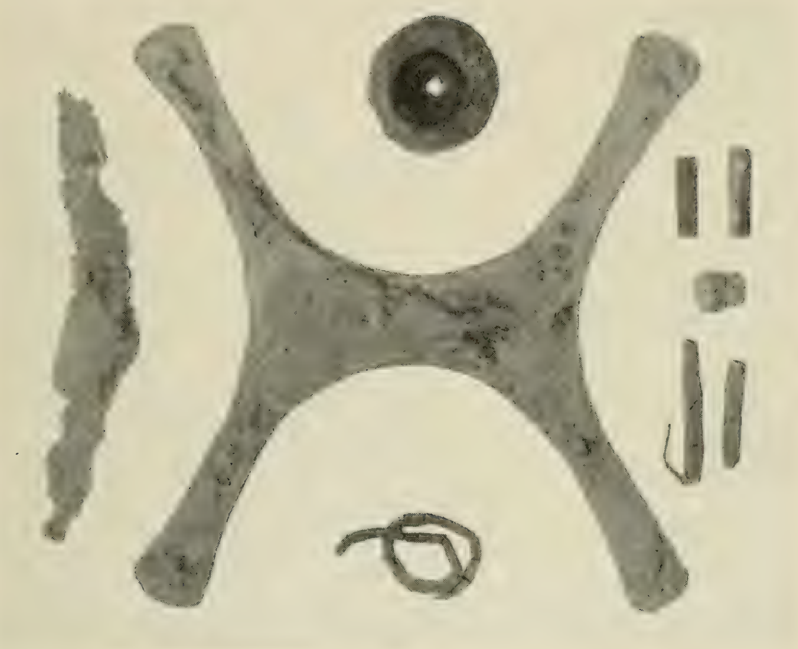
2. THREE TYPICAL COPENA POINTS, A CACHE IN FEATURE NO. 24. SITE HN° 4.



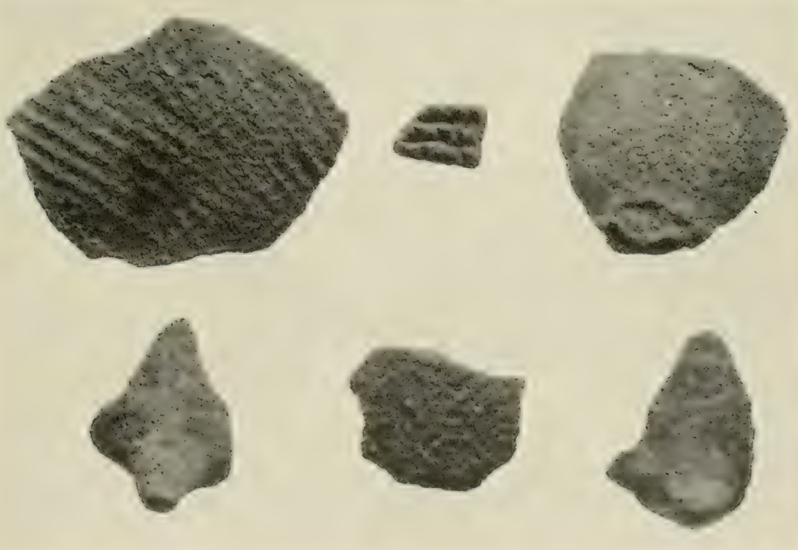
1. Small Greenstone Celts. Site Hn° 4.



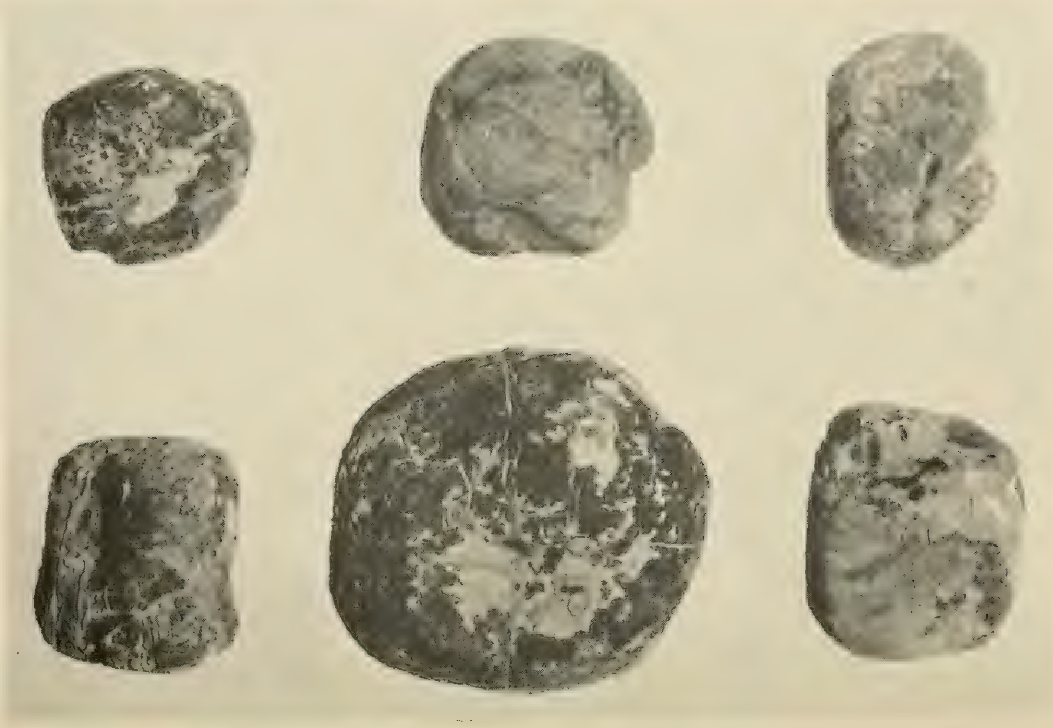
2. Large Greenstone Celts. Site Hn° 4.



1. COPPER ARTIFACTS. SITE HNo 4.



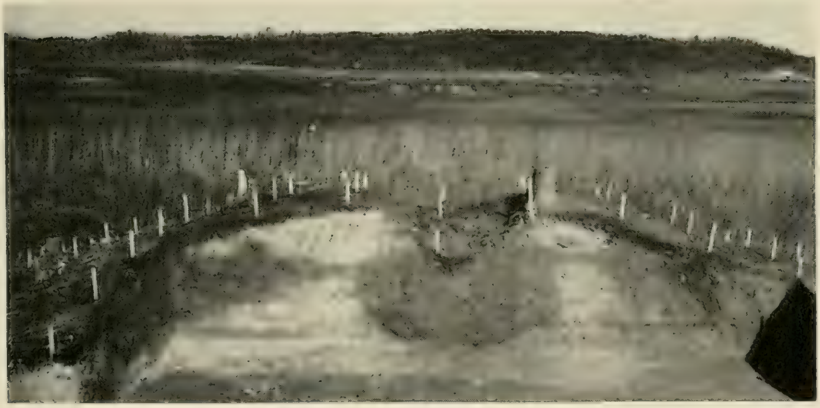
2. ENTIRE POTTERY COLLECTION FROM SITE HNo 4.



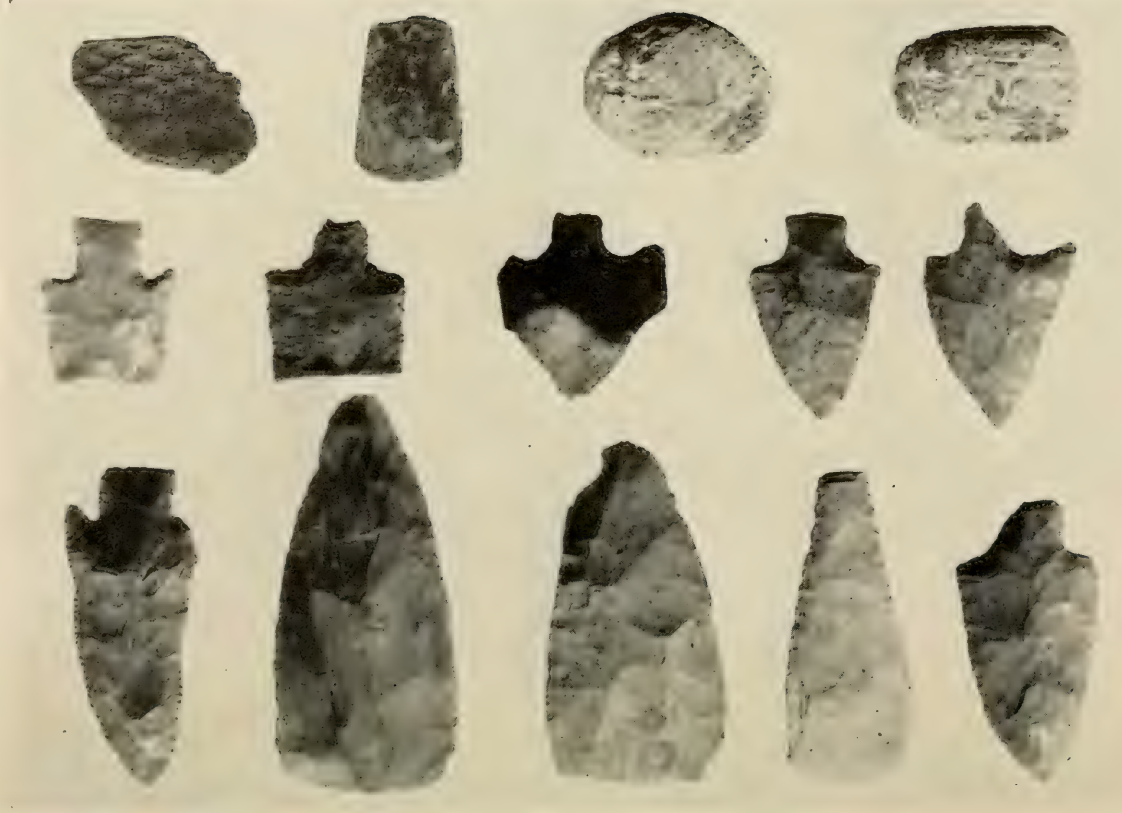
GALENA BALLS FROM BURIAL PITS. SITE Hn° 4.

1. SITE CLEARED AND STAKED. SITE HNo 49.

2. THE 25-FOOT PROFILE AND TILLED TRENCH OF FORMER EXCAVATOR. SITE HNo 49.

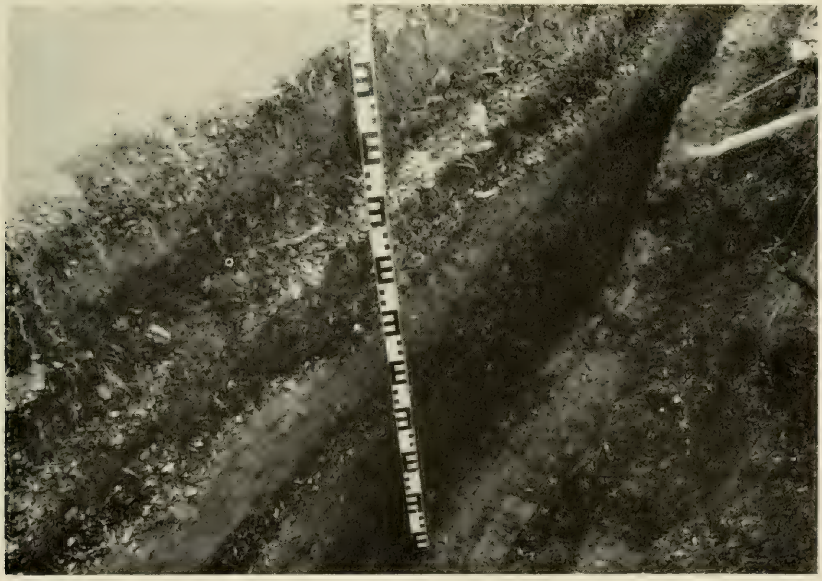


3. THE 35-FOOT PROFILE AND CROSS SECTION OF OLD TRENCH. SITE HNo 49.

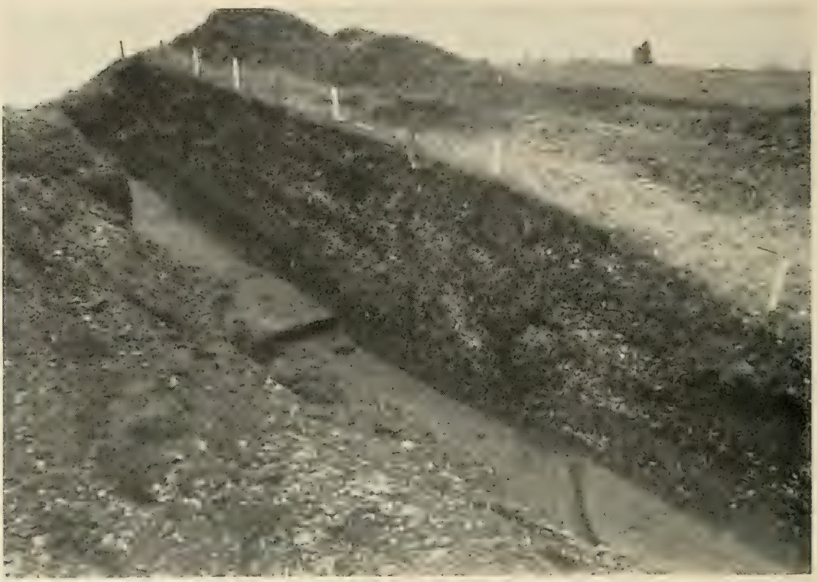


ARTIFACTS FROM GENERAL DIGGING. SITE HNo 49.

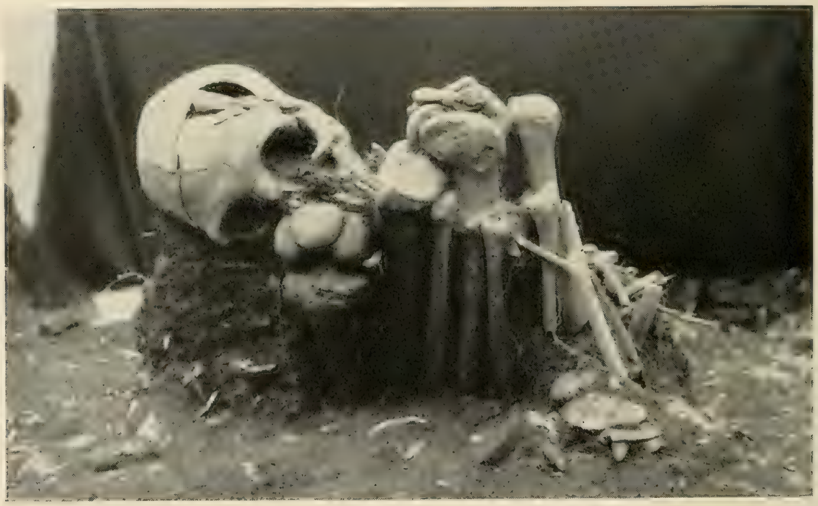
1. THE ERODED RIVER FACE OF SITE Lu° 5. SMITHSONIA LANDING.



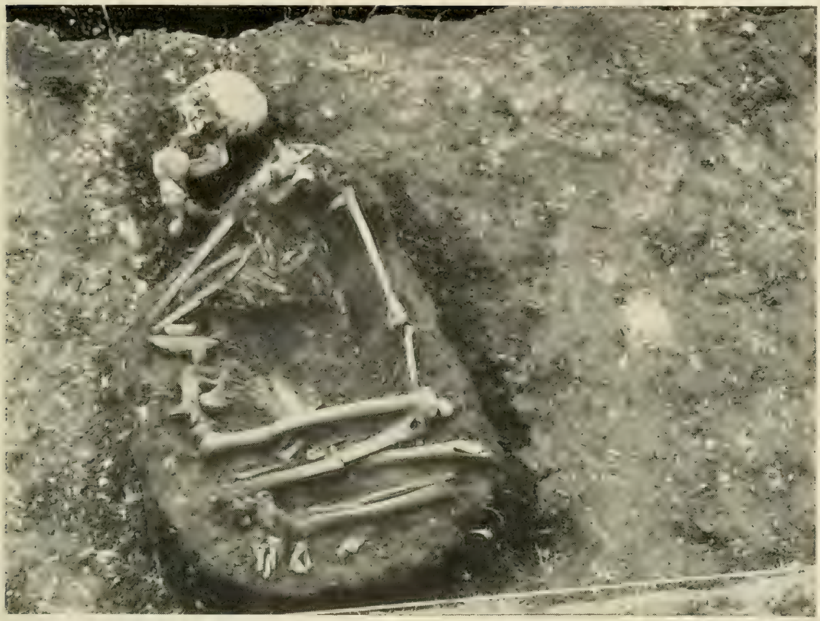
2. PORTION OF 55-FOOT PROFILE BETWEEN SQUARES 55L3 AND 55R1. SITE Lu° 5.



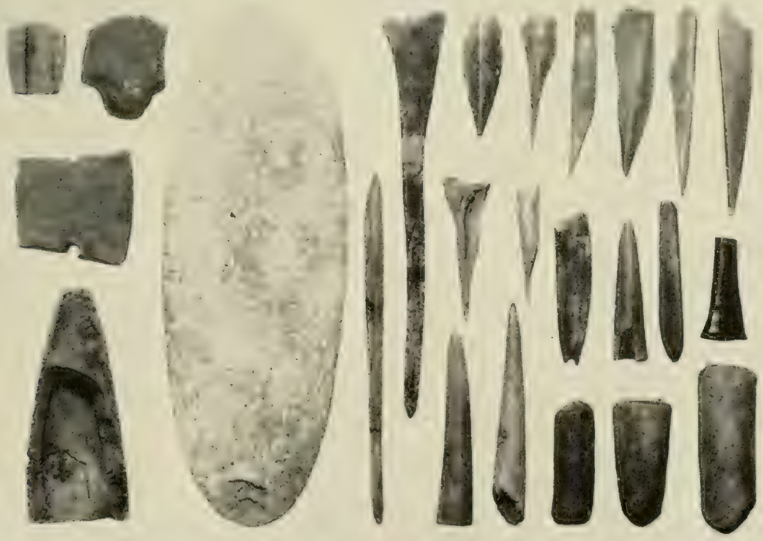
1. THE 60-FOOT PROFILE. SITE Lu° 5.



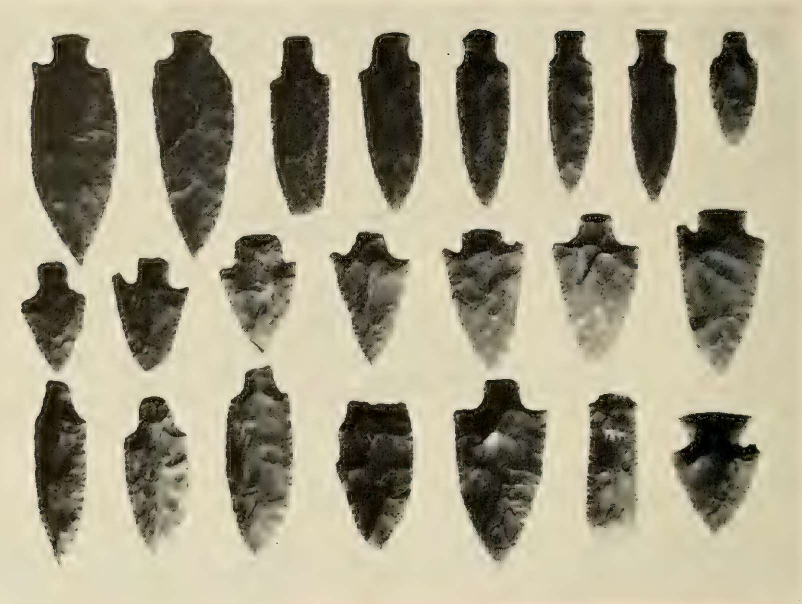
2. BURIAL NO. 2 IN SITU; SEATED AND PARTLY EXPOSED. SITE Lu° 5.



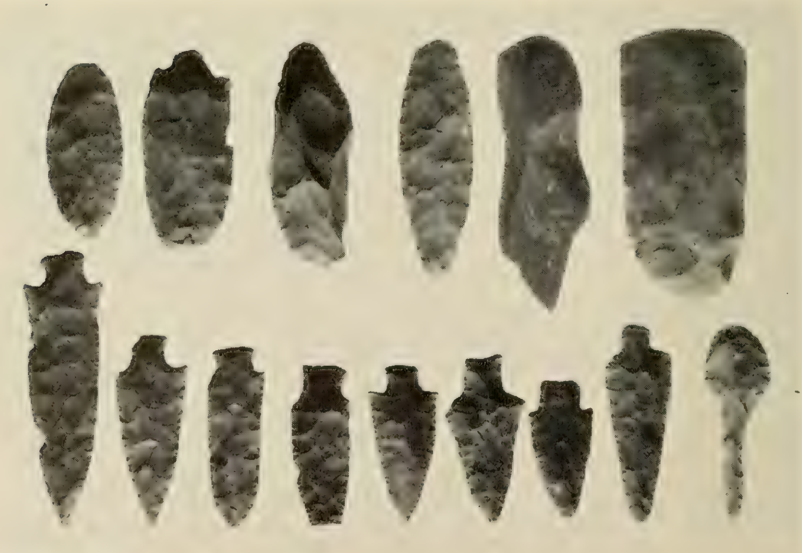
1. BURIAL NO. 1; SKULL DESTROYED BY DISTURBANCE. SKULL SHOWN IS THAT OF BURIAL NO. 2 (PL. 36, FIG. 2). SITE Lu°5.



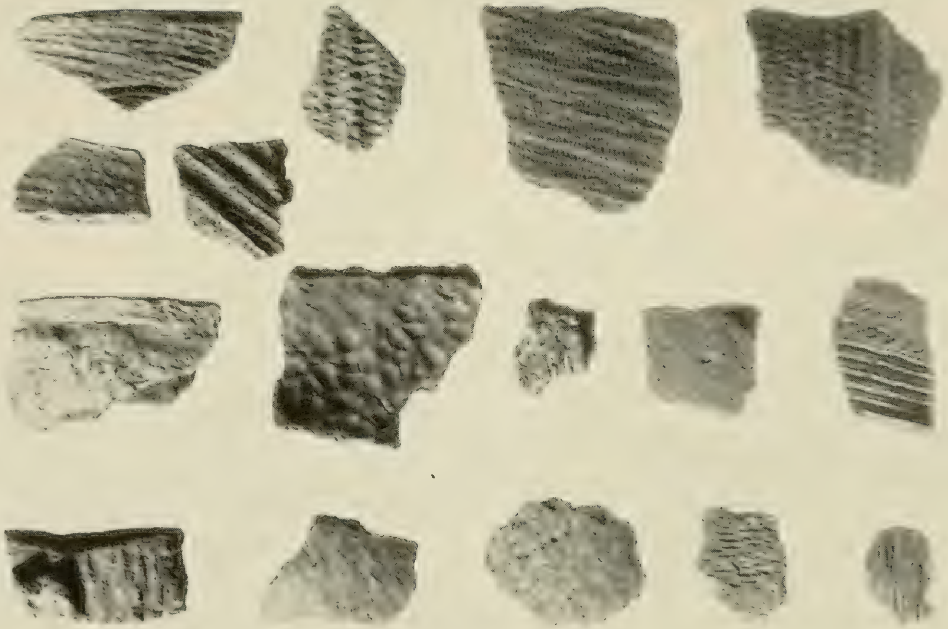
2. BONE, ANTLER, AND STONE ARTIFACTS. SITE Lu°5.



1. FLINT POINTS, TYPES 7, 13, AND 16. SITE LU° 5.

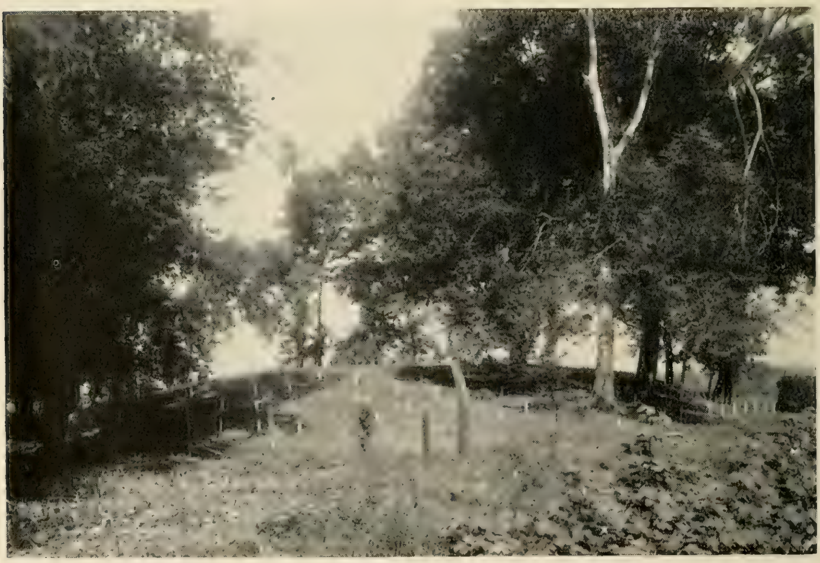


2. FLINT POINTS, TYPES 1 AND 17. SITE LU° 5.

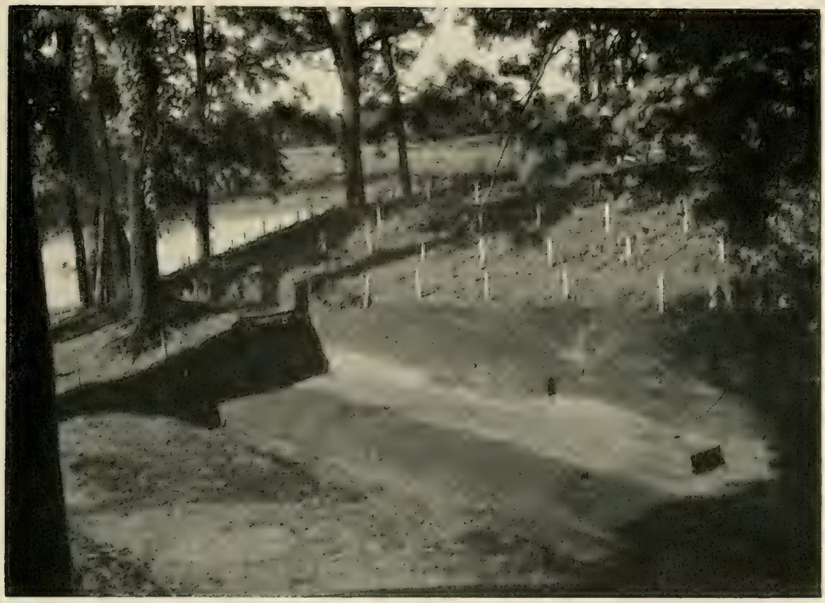


POTTERY TYPE SHERDS. SITE LU 5.

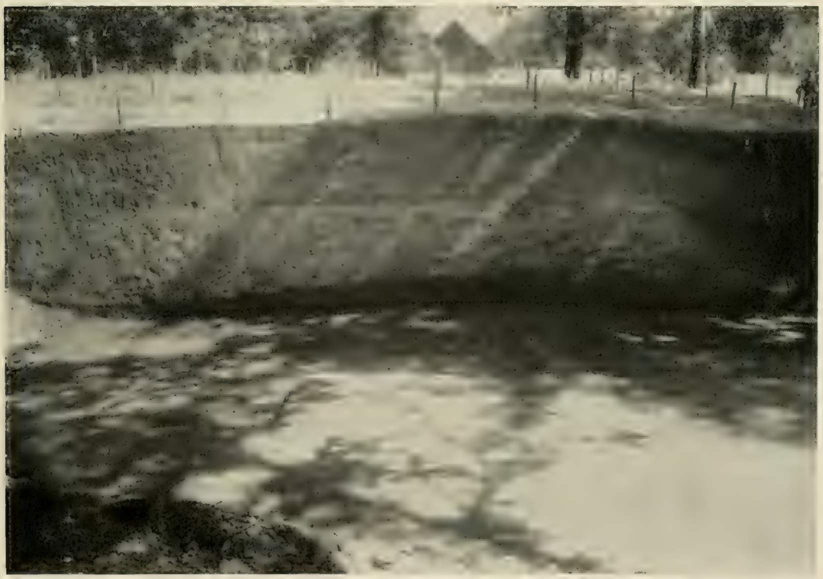
1. View of Mound From Across the Slough, Showing Steel Cable From the Tow Head and Landing at Site Lu° 21.



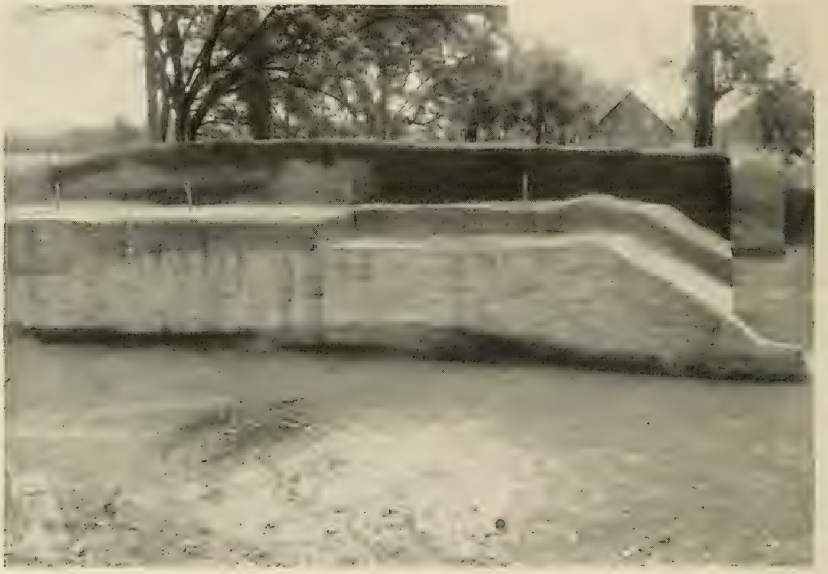
2. The Mound From the East After Staking. Site Lu° 21.



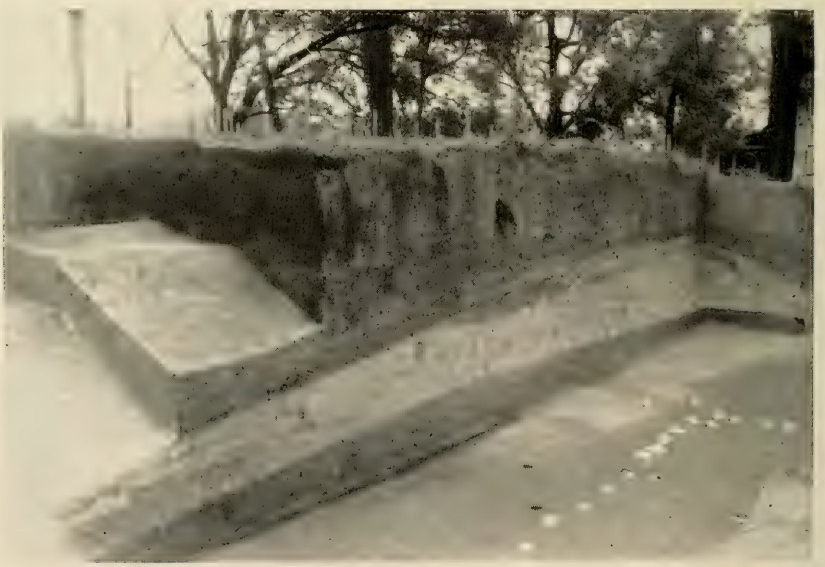
1. THE 20-FOOT PROFILE, SHOWING BROWN SAND STRATUM. SITE LU° 21.



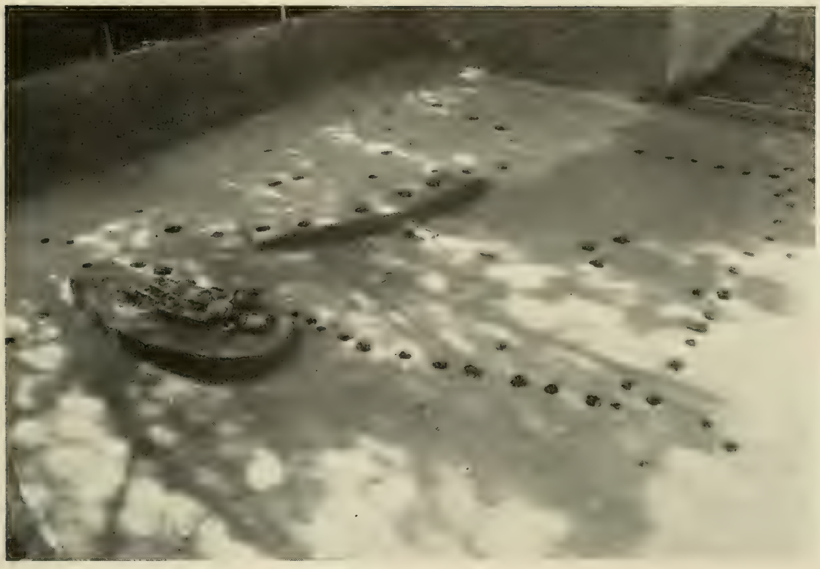
2. THE 35-FOOT PROFILE, SHOWING BLUE CLAY PYRAMID AT BASE SITE LU° 21.



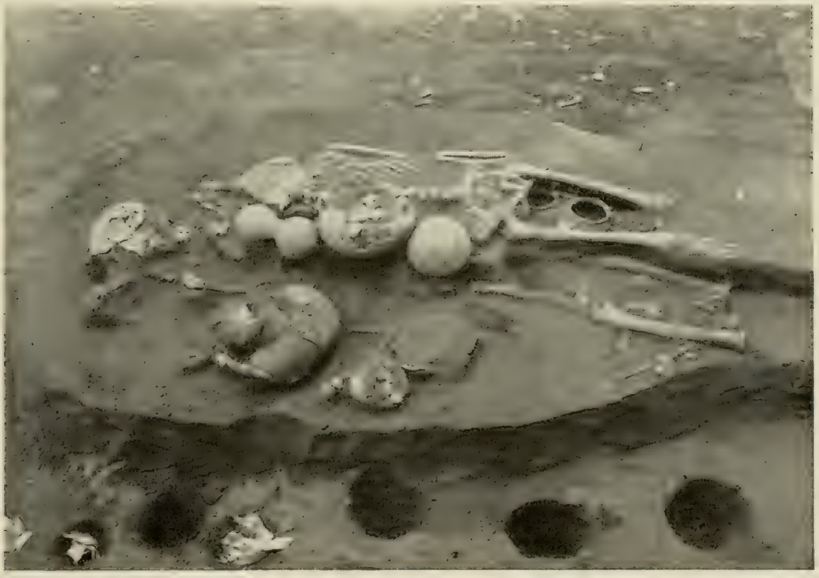
1. Horizontal Cutting To Reveal Floors. Developing Profile Is the 45-Foot Profile. Site Luº 21.



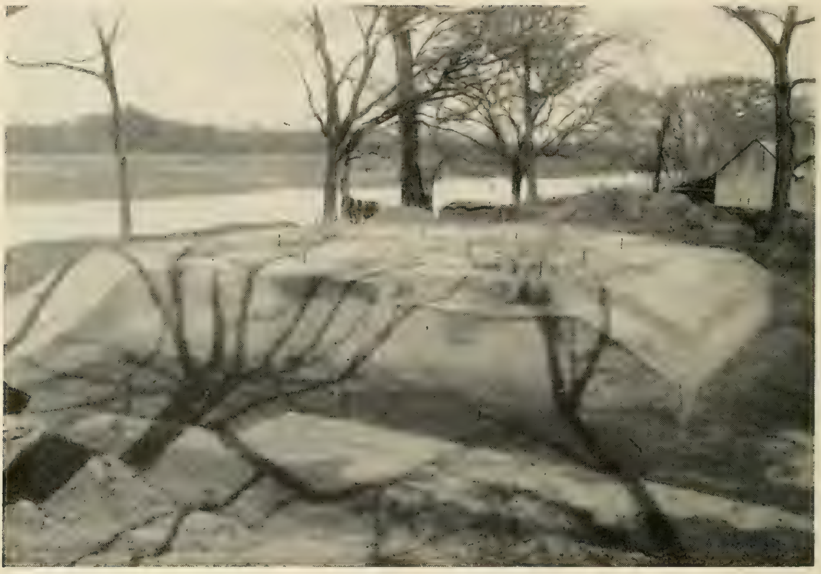
2. The R-4 Profile, Showing Three Occupation Levels. Site Luº 21.



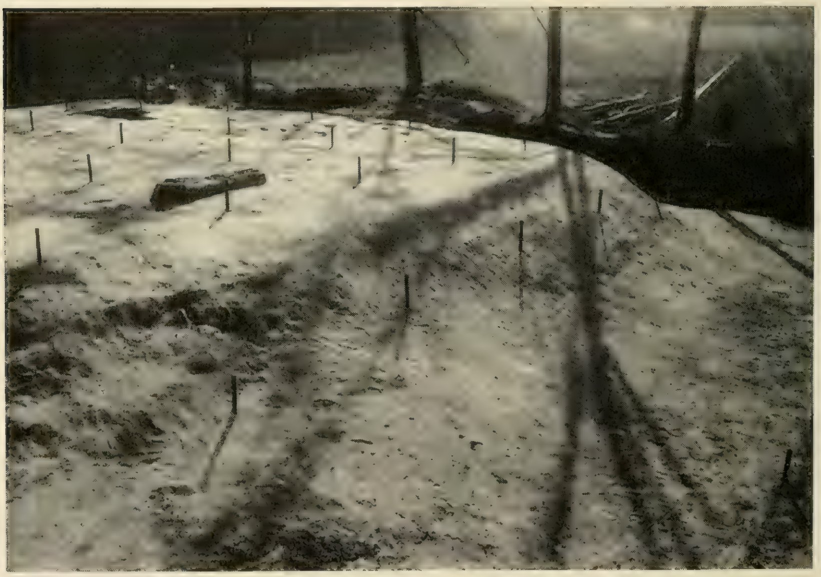
1. Feature No. 7 Seen From the North. Site Lu° 21.



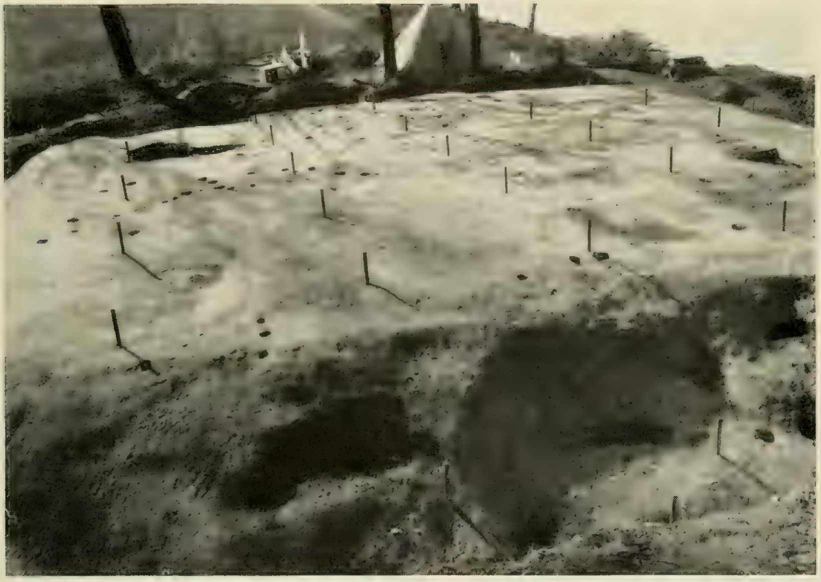
2. Burials Nos. 2 and 3. Note Large Owl-Effigy Water Bottle. Site Lu° 21.



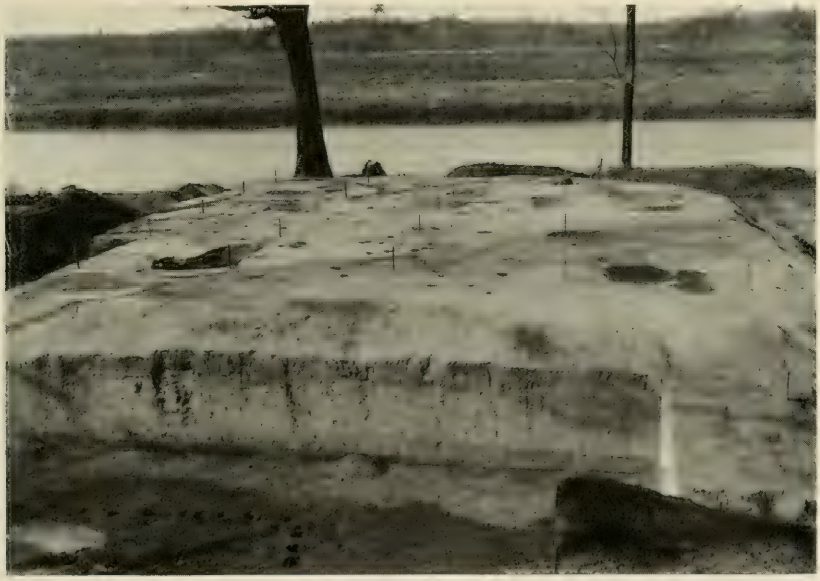
1. "FLOOR A," COMPLETELY CLEARED, FROM THE WEST. SITE LU° 21.



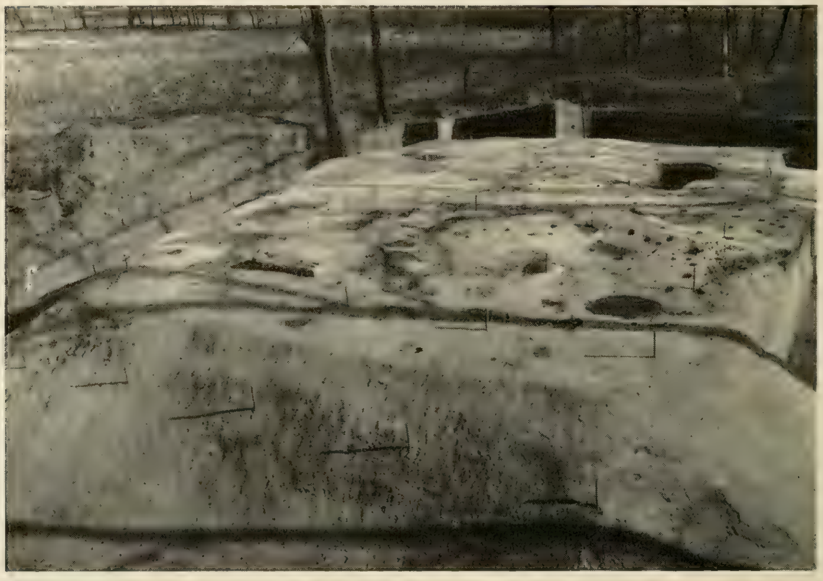
2. SHOWING SLOPE AND HEIGHT OF PYRAMID FOR "FLOOR A." SITE LU° 21.



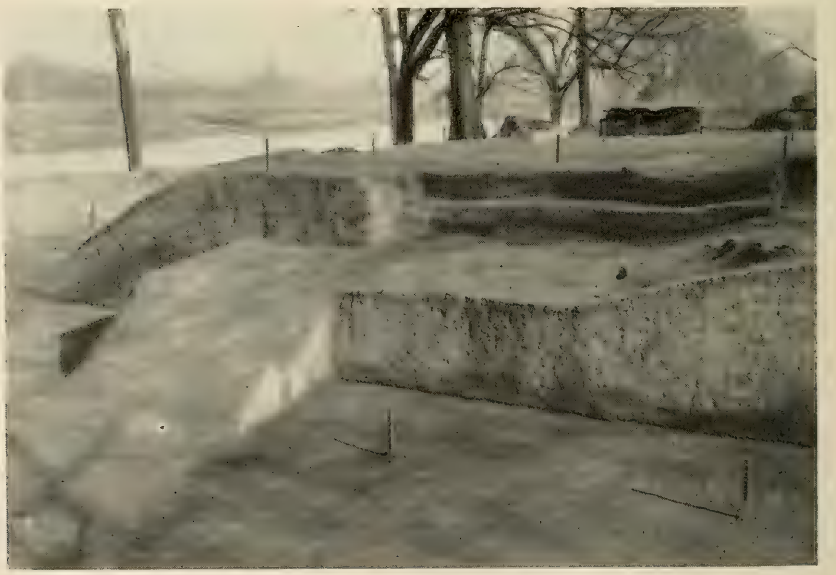
1. POST MOLDS ON "FLOOR A" SEEN FROM EAST. SITE Lu° 21.



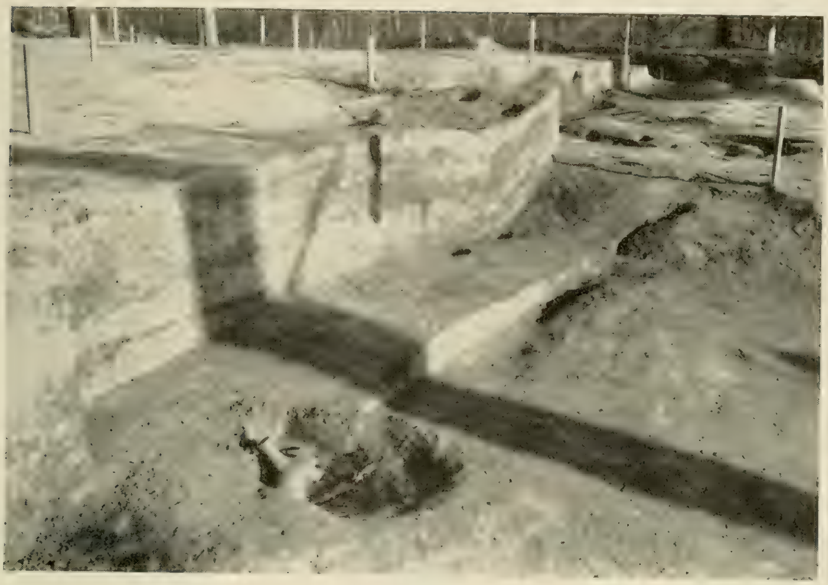
2. "FLOOR A" FROM SOUTH, SHOWING MOUND STRUCTURE. SITE Lu° 21.



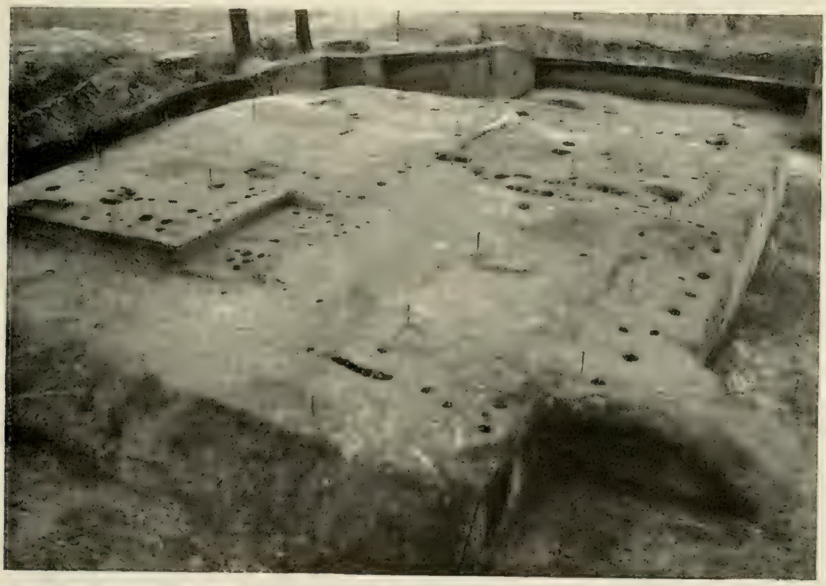
1. "FLOOR A" SHOWING BURIAL NO. 7 AND BURIAL PIT OF BURIAL NO. 9. SITE LU° 21.



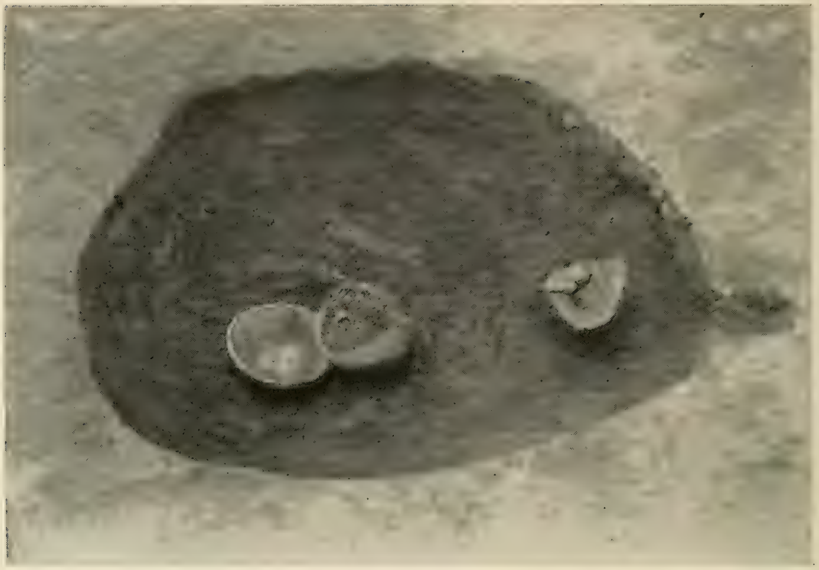
2. PORTIONS OF THE 35-FOOT, THE 40-FOOT, AND THE 45-FOOT PROFILES. SITE LU° 21.



1. THE 45-FOOT PROFILE AND EFFIGY WATER BOTTLE IN SITU. SITE LU° 21.

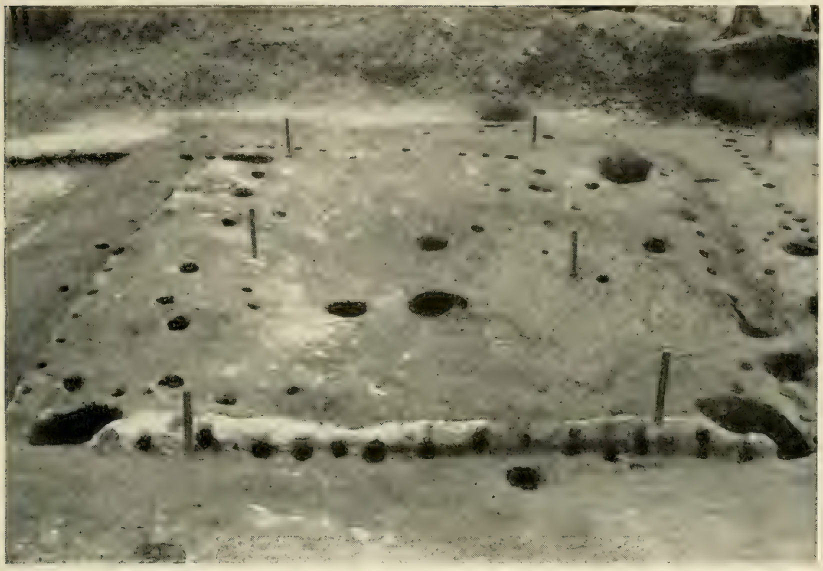


2. POST-MOLD PATTERNS ON "FLOOR B." SITE LU° 21.

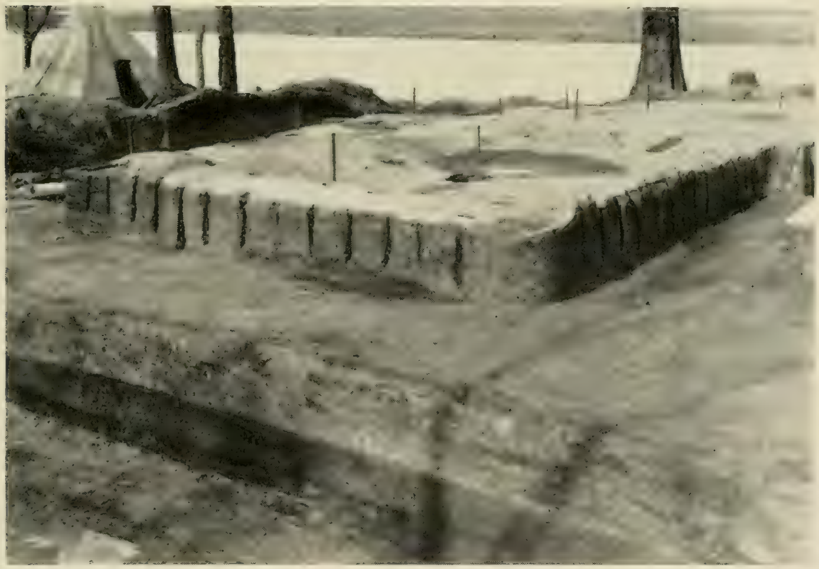


1. FEATURE NO. 5: POTS IN PIT IN R2 CUT. SITE LU° 21.

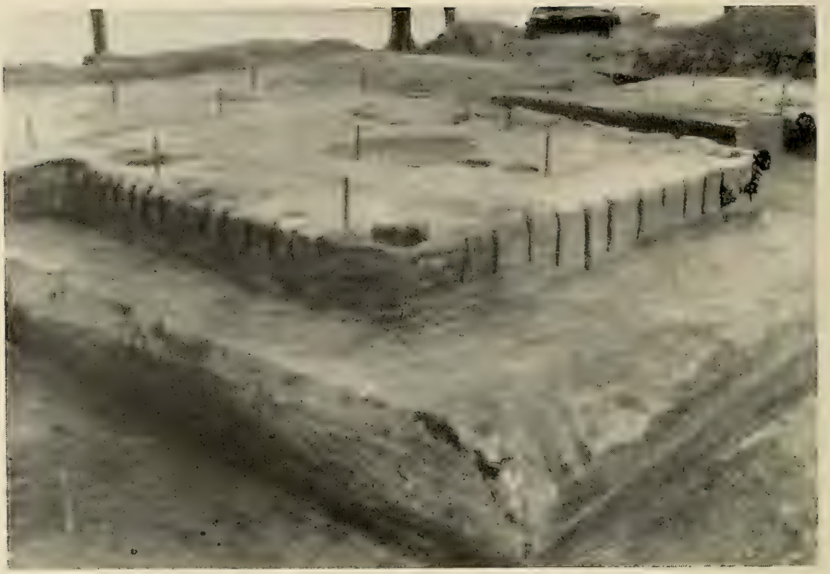
2. BURIAL NO. 9 WITH ASSOCIATIONS. SITE LU° 21.



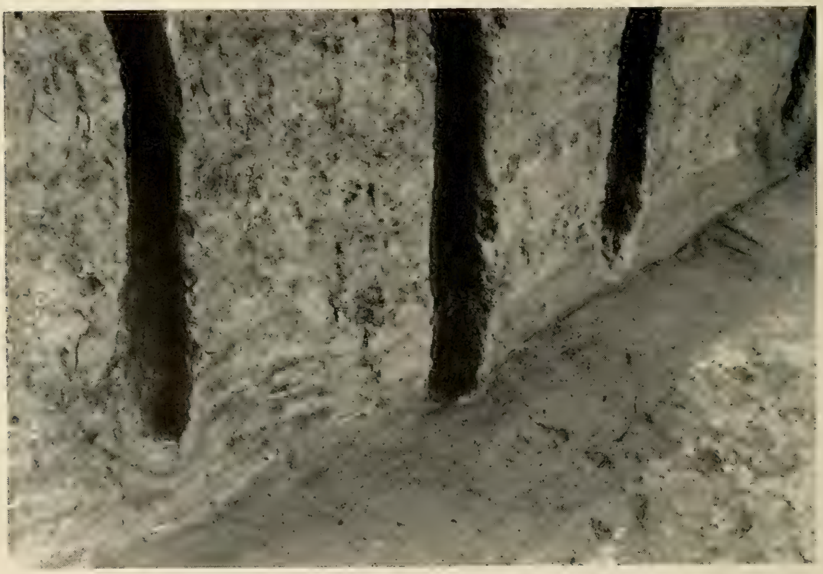
1. POST-MOLD PATTERN, FEATURE NO. 2. LARGE POST MOLDS, ONE IN EACH CORNER. SITE LU° 21.



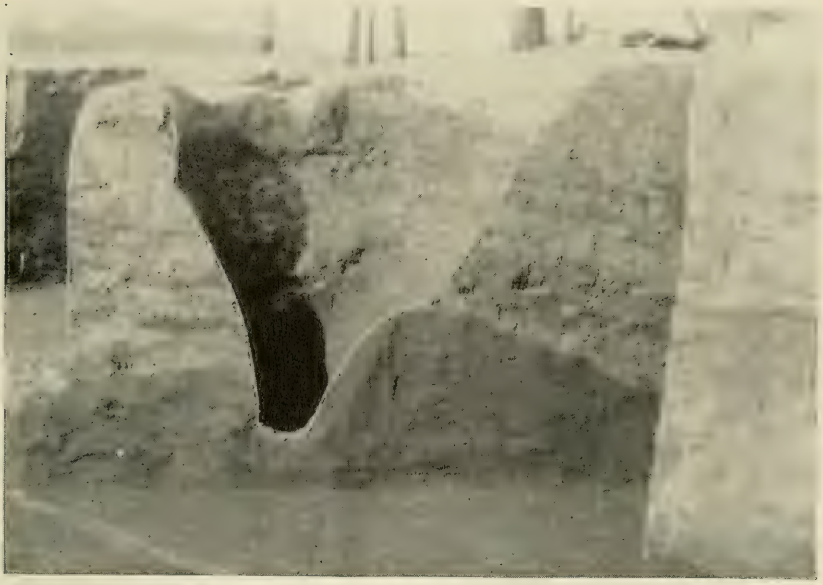
2. FEATURE NO. 2, SHOWING LONGITUDINAL SECTIONS OF POST MOLDS IN SOUTH AND EAST WALLS. SITE LU° 21.



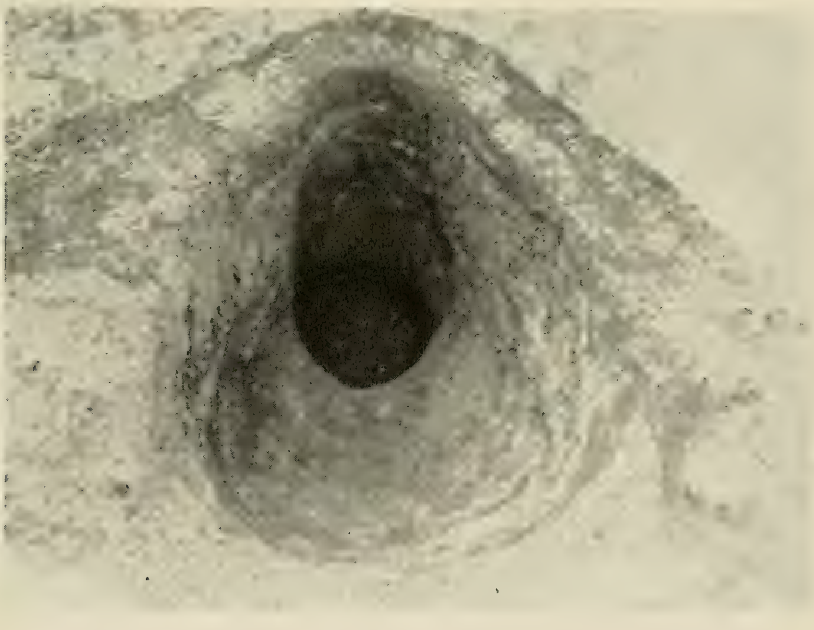
1. Feature No. 2, Showing Vertical Section of West and South Walls and Central Fire Basin. Site Lu° 21.



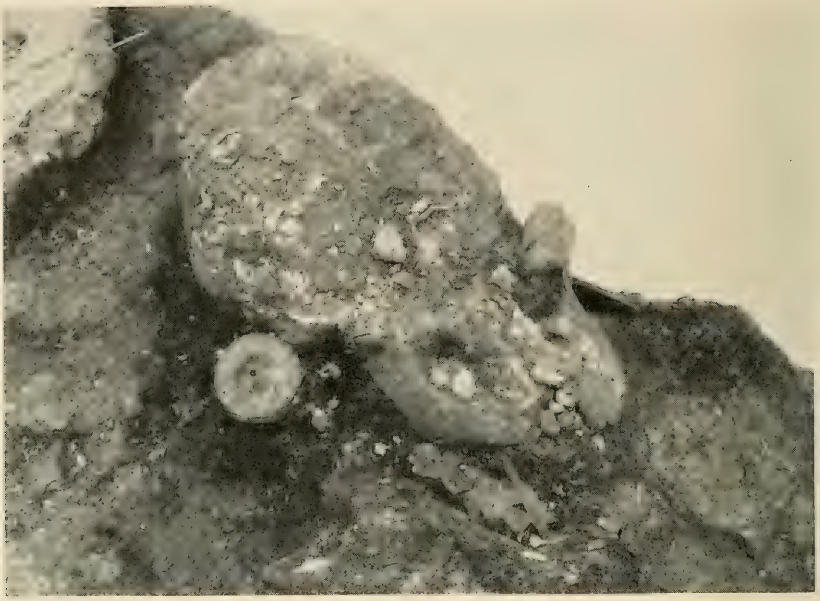
. Longitudinal Section of Post Molds, Feature No. 2, To Show Deformation of Loading Layers Under Posts. Site Lu° 21.



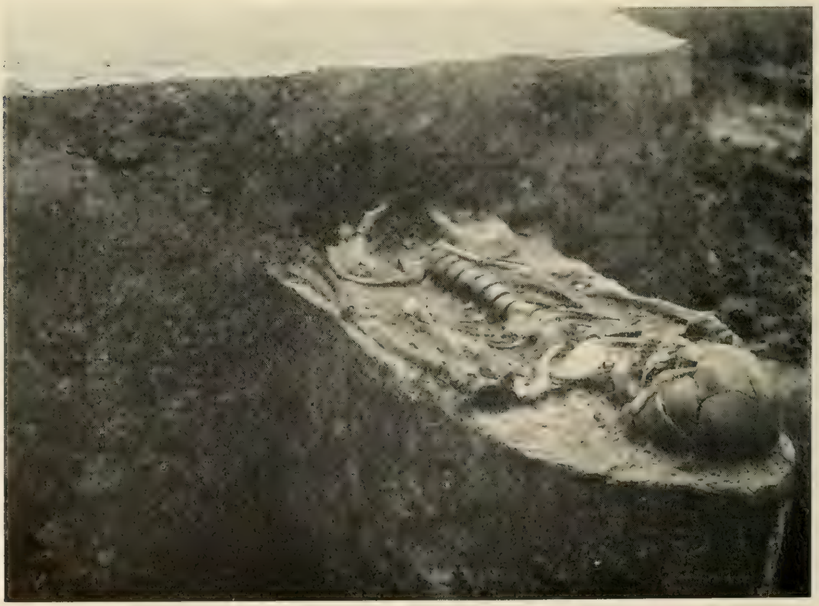
1. LONGITUDINAL SECTION, POST MOLD IN NORTHWEST CORNER, FEATURE NO. 3. SITE LU° 21.



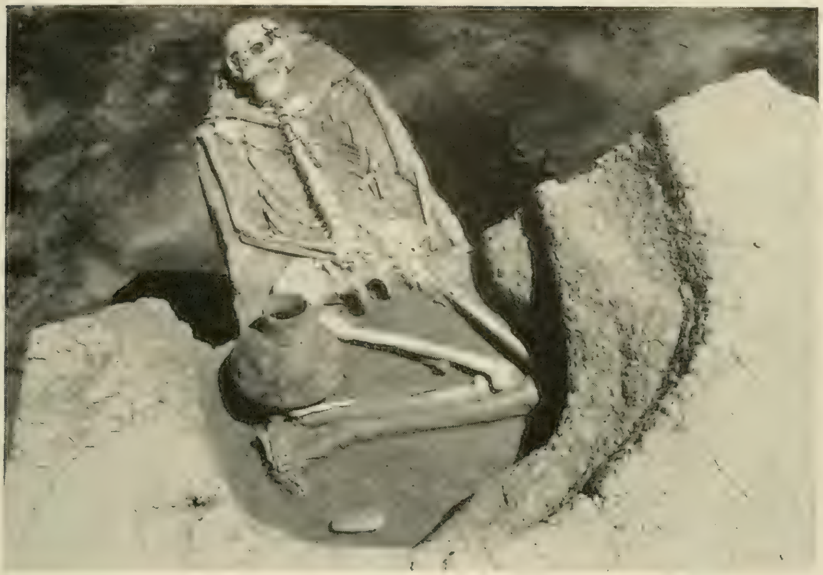
2. CLOSE-UP OF VERTICAL VIEW OF CORNER POST MOLD. SITE LU° 21.



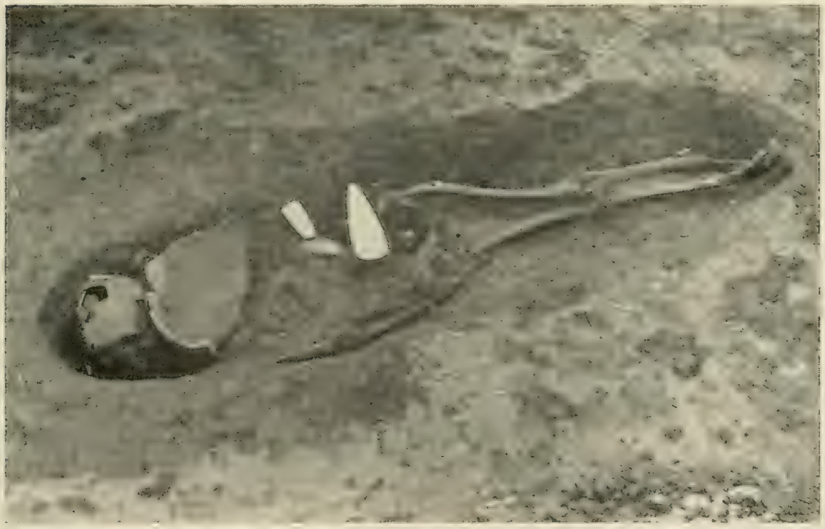
1. COPPER EAR SPOOLS AND COPPER PENDANT ABOUT SKULL OF BURIAL NO. 14. SITE Lu° 21.



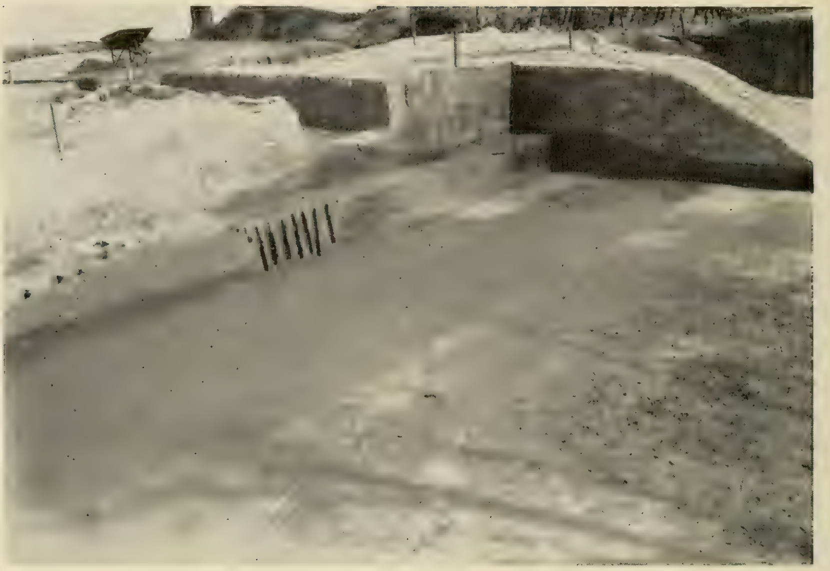
2. BURIAL NO. 13 IN SUBFLOOR PIT, PARTIALLY UNCOVERED. SITE Lu° 21.



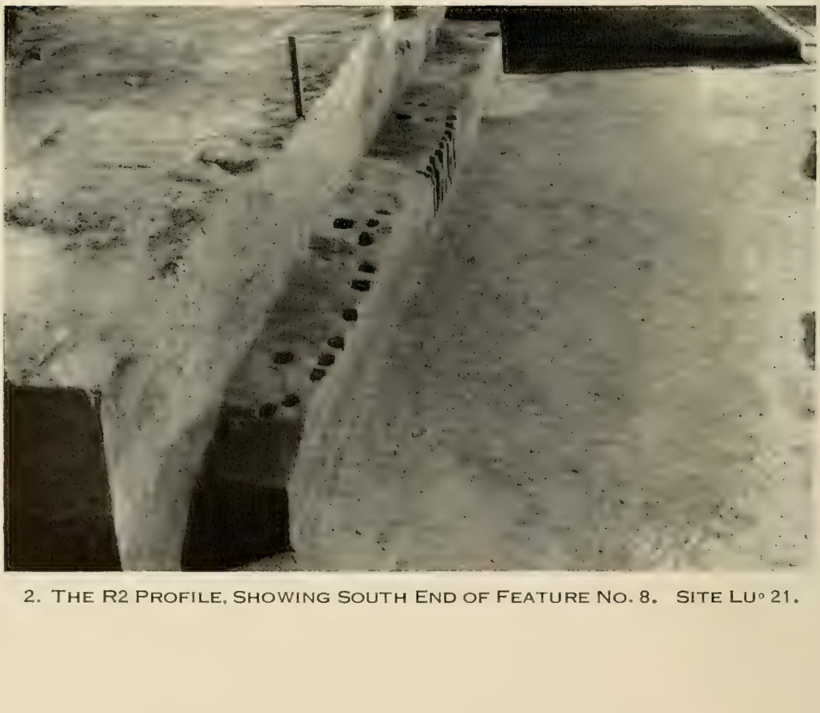
1. BURIAL NO 13, COMPLETELY EXCAVATED, SHOWING FORM OF SUBFLOOR PIT. SITE LU° 21.



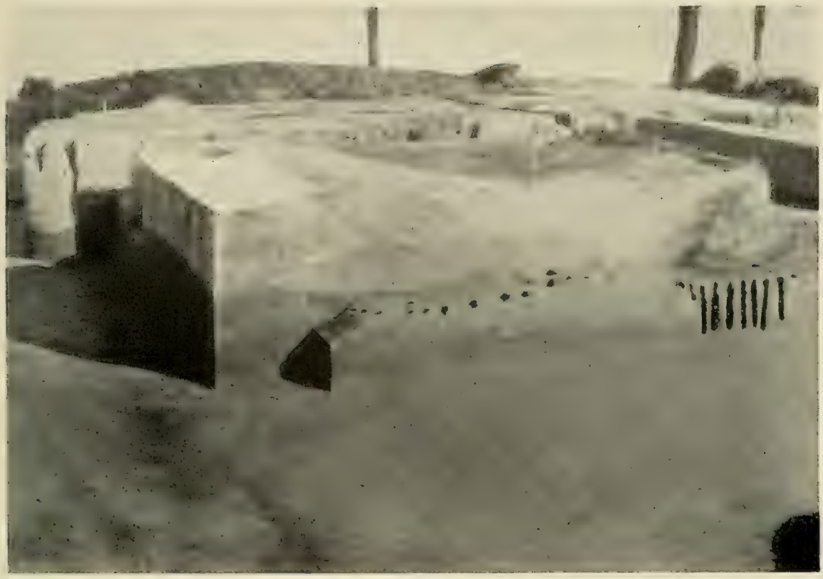
2. BURIAL NO. 10, WITH LARGE POTSHERD AND FOUR GREENSTONE CELTS. SITE LU° 21.



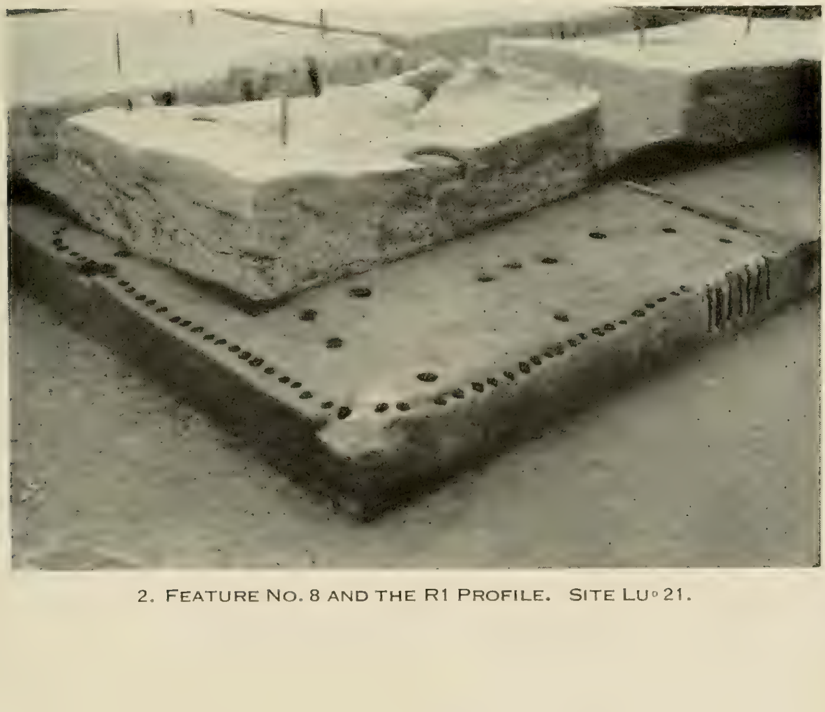
1. THE R2 PROFILE, SHOWING POST-MOLD PATTERN IN BLACK SAND, FEATURE NO. 8. SITE LU° 21.



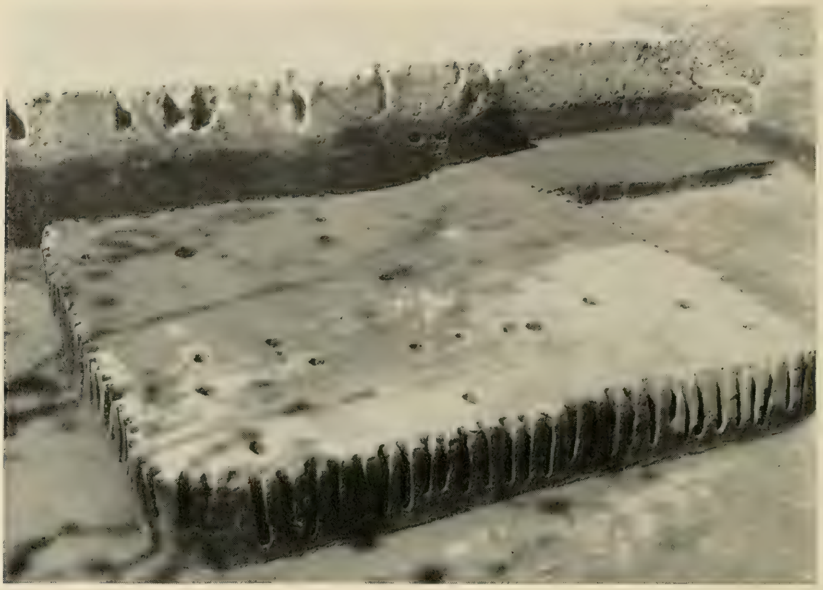
2. THE R2 PROFILE, SHOWING SOUTH END OF FEATURE NO. 8. SITE LU° 21.



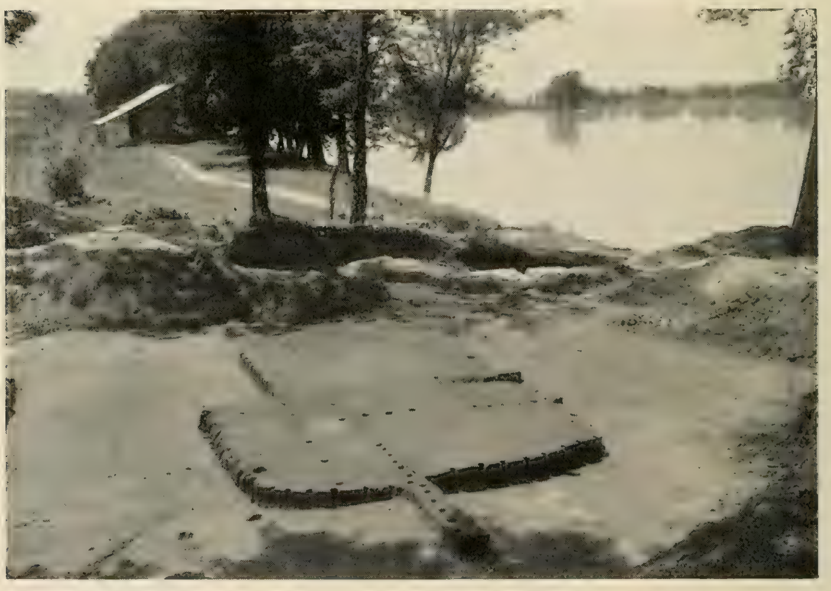
1. THE 40-FOOT PROFILE AND THE R2 PROFILE, LOOKING NORTHWARD TOWARD SLOUGH. SITE LU° 21.



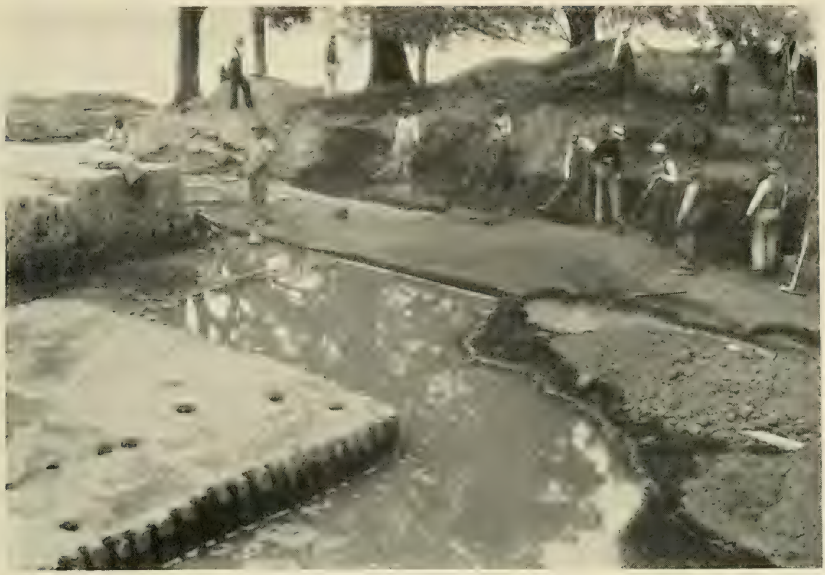
2. FEATURE NO. 8 AND THE R1 PROFILE. SITE LU° 21.



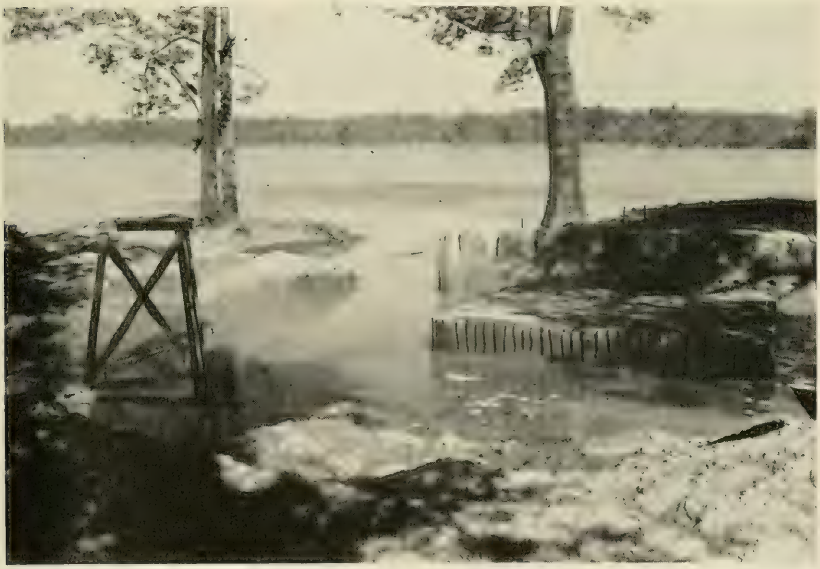
1. FEATURE NO. 8, COMPLETELY UNCOVERED. SITE LU° 21.



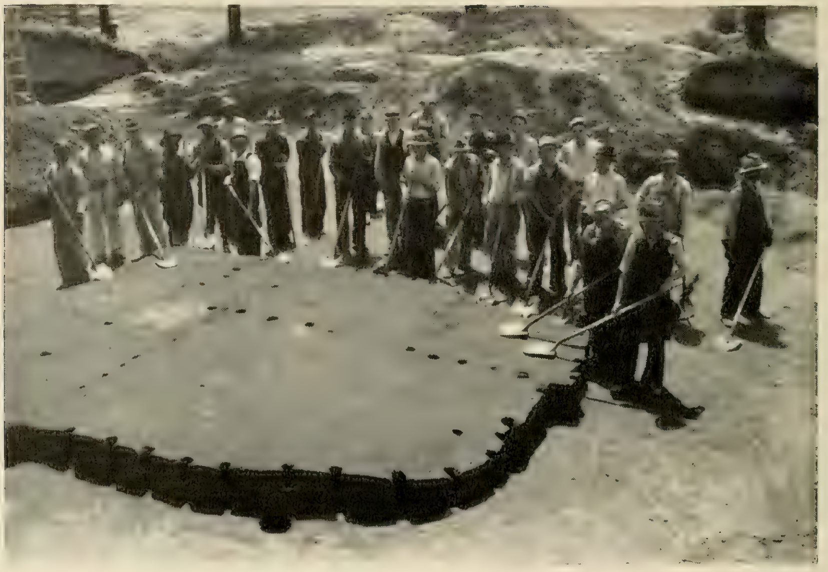
2. FEATURE NO. 10. SITE LU° 21.



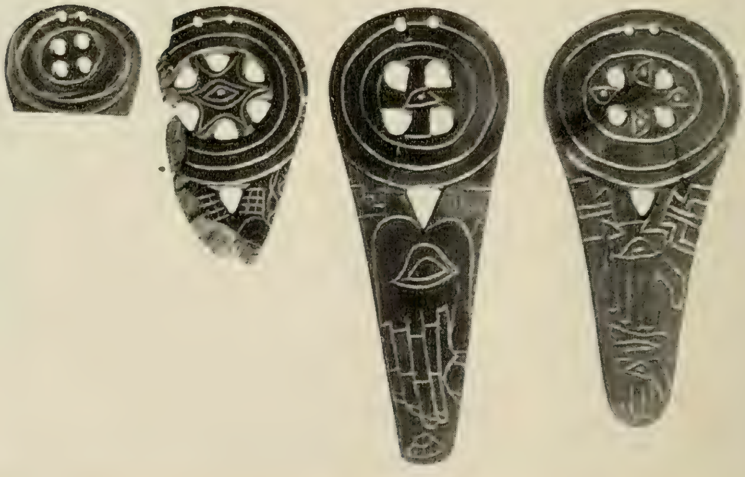
1. BACK WATER FROM RIVER OWING TO HEAVY RAINS MADE EXCAVATION DIFFICULT IN SPRING. SITE LU° 21.



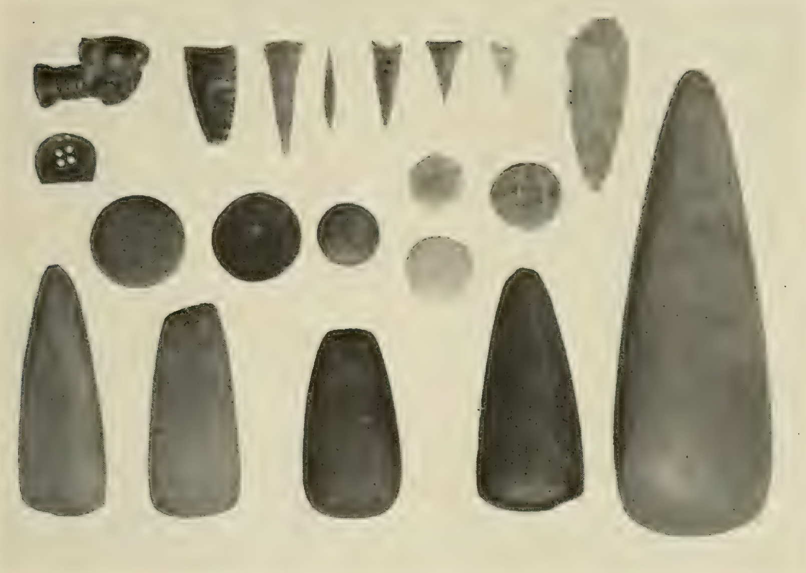
RAINS BROUGHT PICKWICK LAKE OUT OF ITS BANKS AND OVER THE LOWER FLOORS; MARCH 1938. SITE LU° 21.



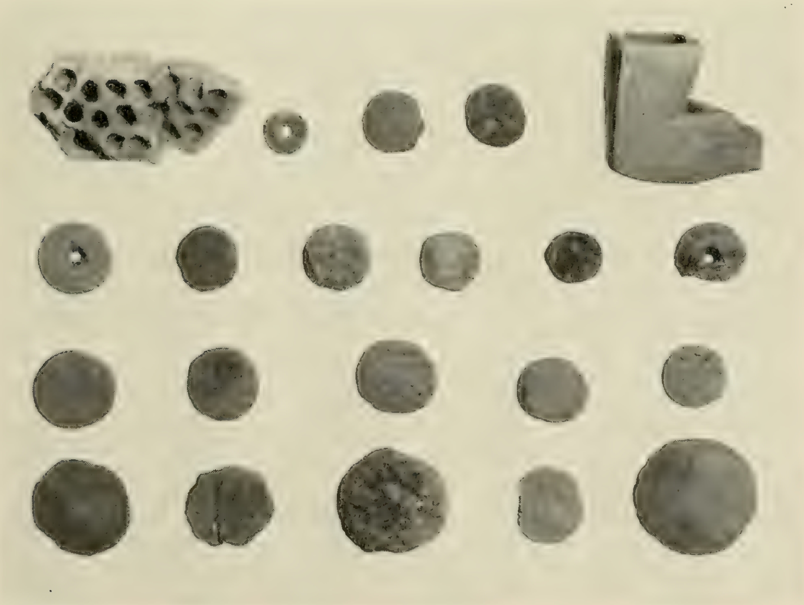
1. THE MEN WHO DID THE WORK. SITE Lu° 21.



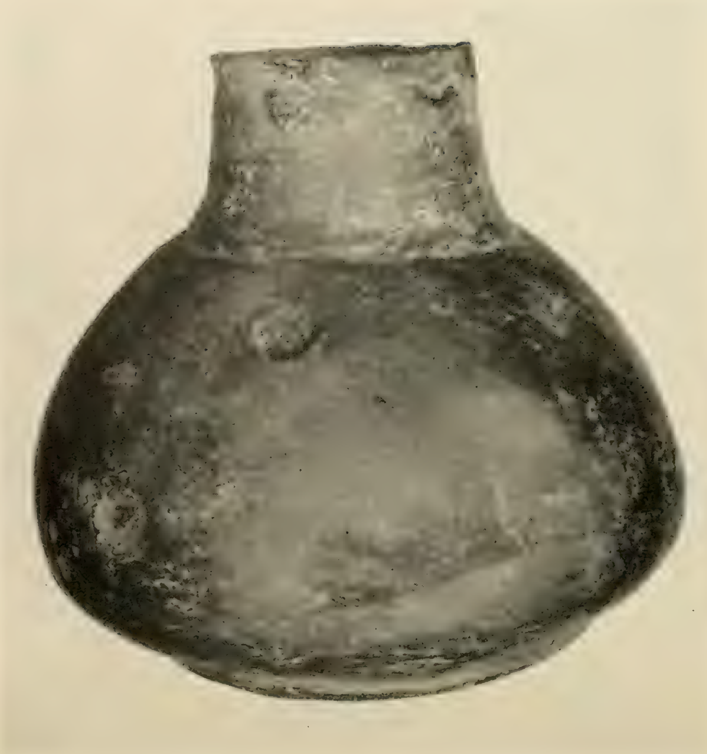
2. CARVED STONE PENDANTS. THREE ON RIGHT ARE FROM MOUNDVILLE.
SITE Lu° 21.



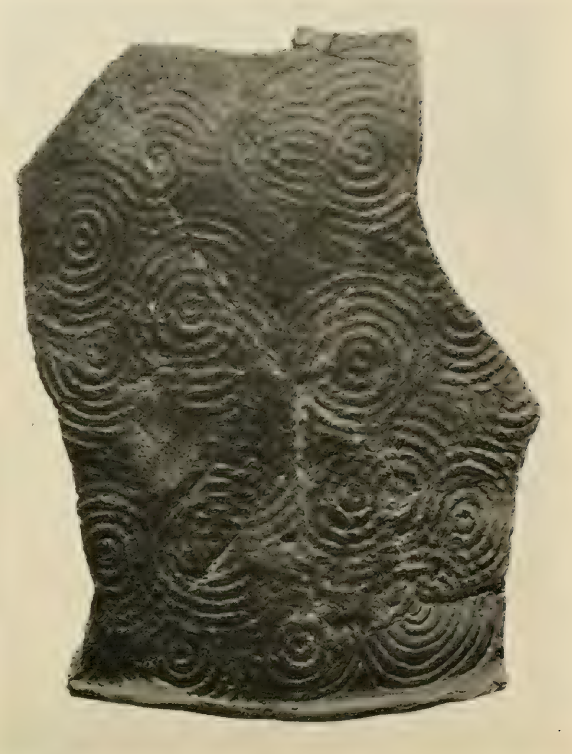
1. MISCELLANEOUS STONE ARTIFACTS. SITE Lu° 21.



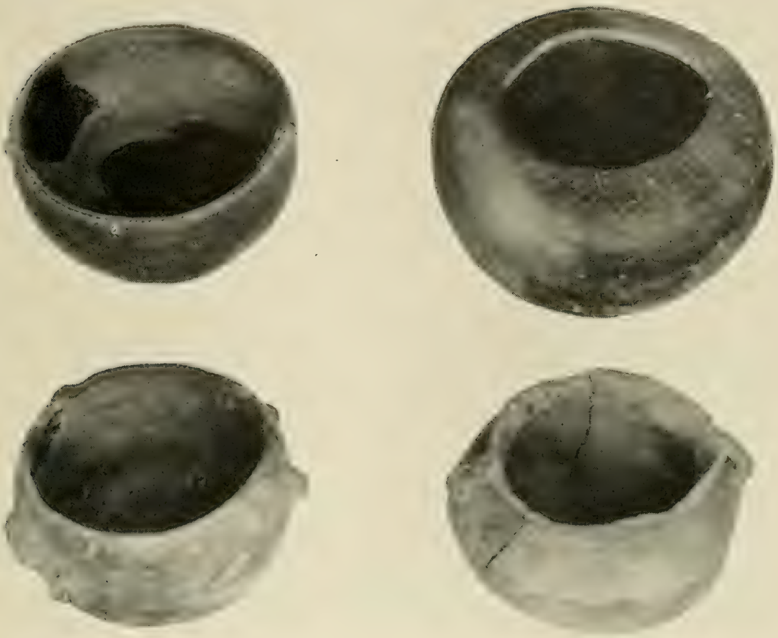
2. POTTERY DISKS, PIPE, AND "DAUBER NEST." SITE Lu° 21.



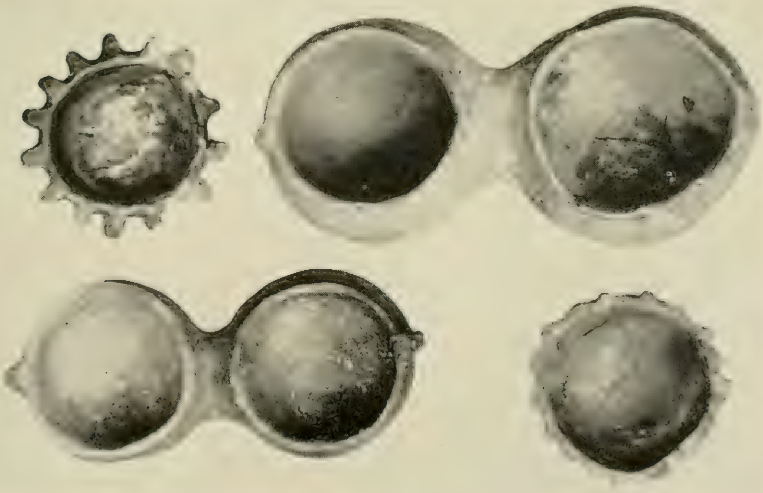
1. WATER BOTTLE WITH BURIAL NO. 13. SITE LU° 21.



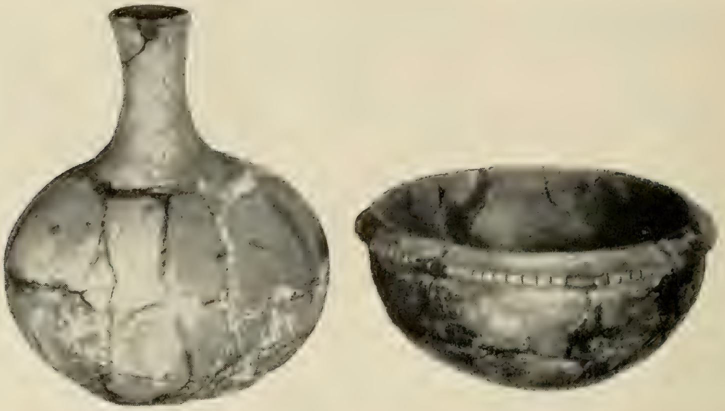
2. LARGE SHERD, COMPLICATED STAMP. SITE LU° 21.



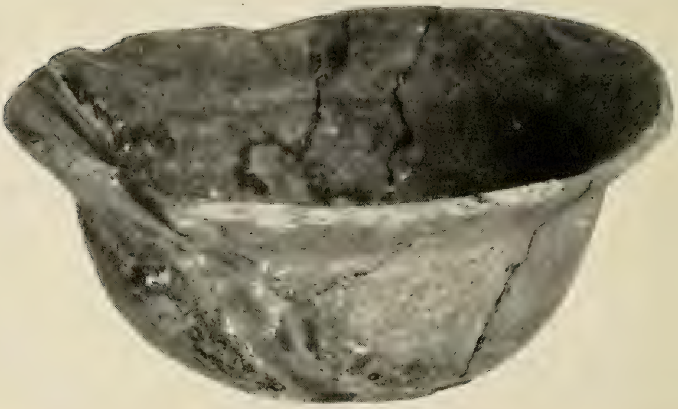
1. Four Small Mortuary Vessels. Site Lu° 21.



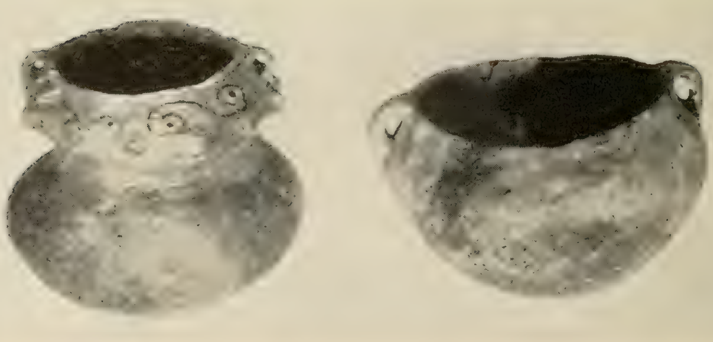
2. Mortuary Vessels of Unusual Forms. Site Lu° 21.



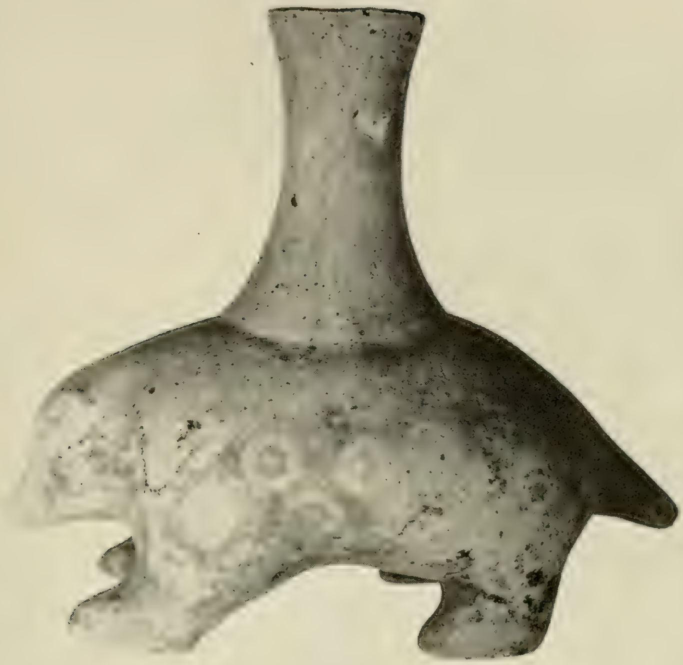
1. Associations With Burial No. 12. Site Lu° 21.



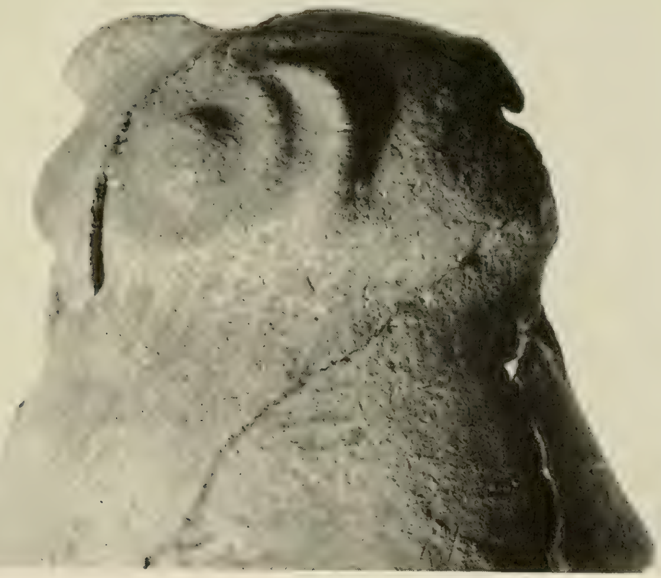
2. Flared-Rim Bowl. Site Lu° 21.



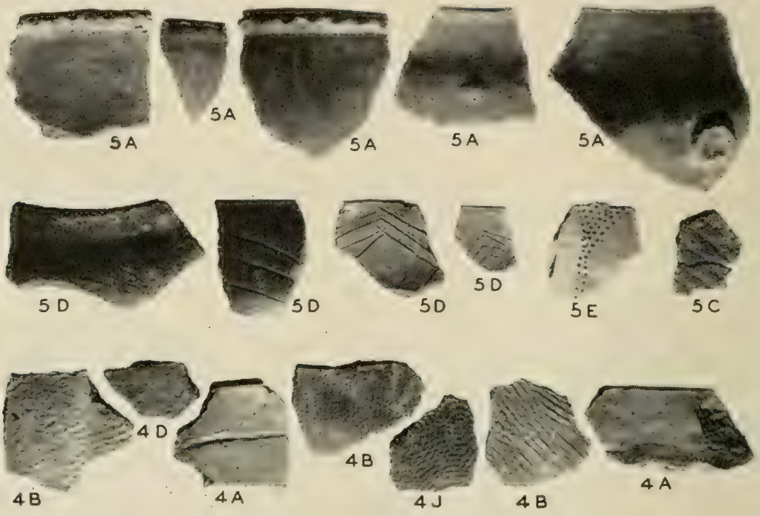
3. Associations With Burials Nos. 2 and 6. Site Lu° 21.



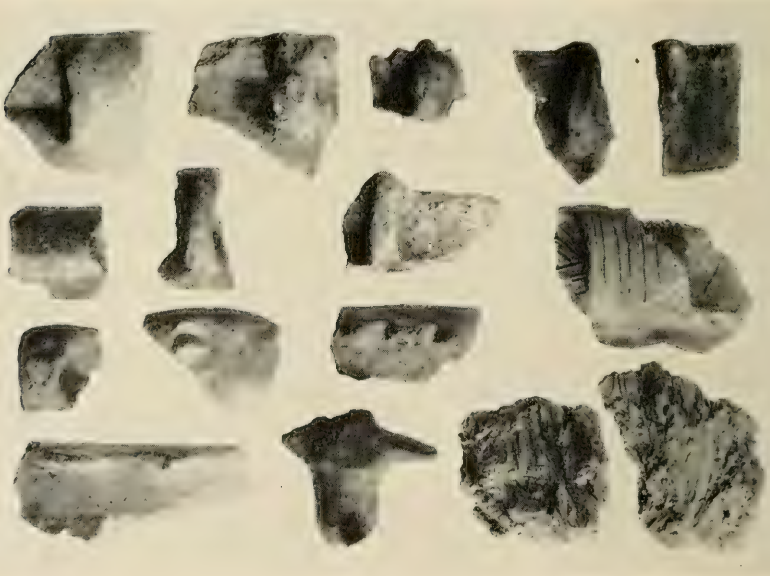
1. EFFIGY WATER BOTTLE. SITE Lu° 21.



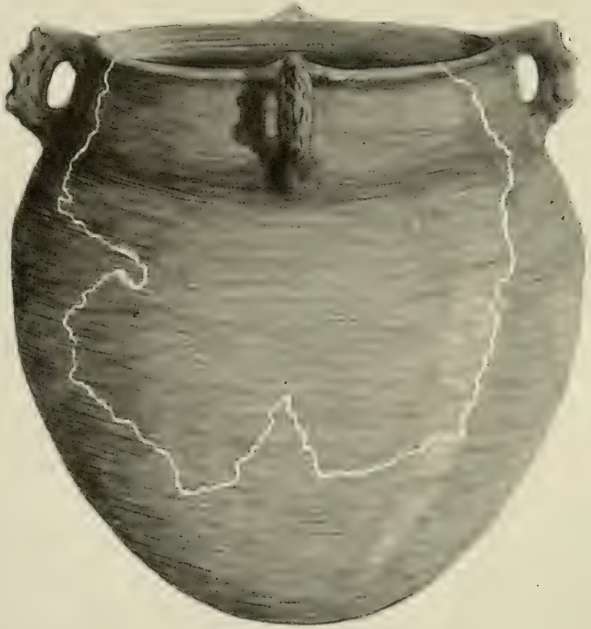
2. OWL-HEAD EFFIGY WATER BOTTLE. SITE Lu° 21.


5A
5A
5A
5A
5A
5D
5D
5D
5D
5E
5C
4B
4D
4A
4B
4J
4B
4A

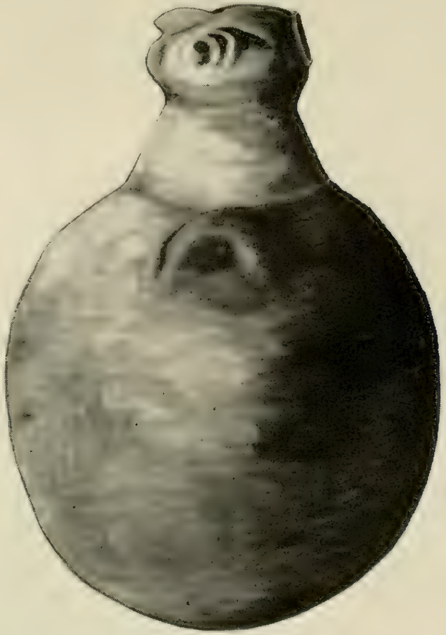
1. Rim and Body Sherds. Site Lu° 21.



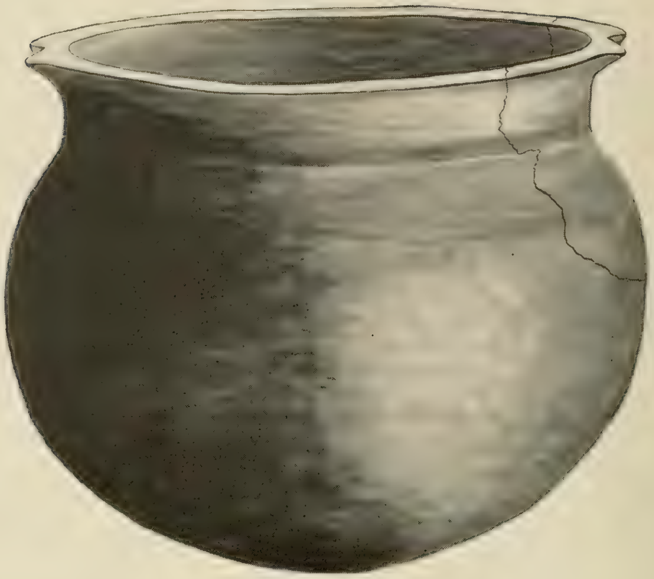
2. Shell-Tempered Sherds, Handles, Lugs, and Two Pieces of Wattle. Site Lu° 21.



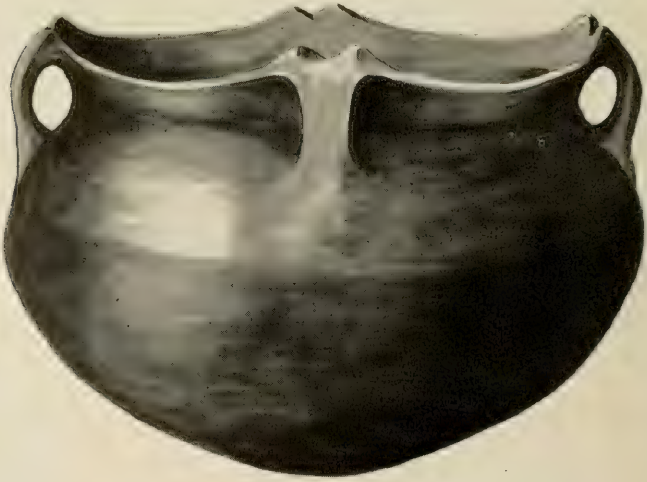
1. Drawing Reproduction of Pot. Height, 13.5 Inches; Maximum Diameter, 13.5 Inches; Mouth Diameter, 9.5 Inches. Site Lu° 21.



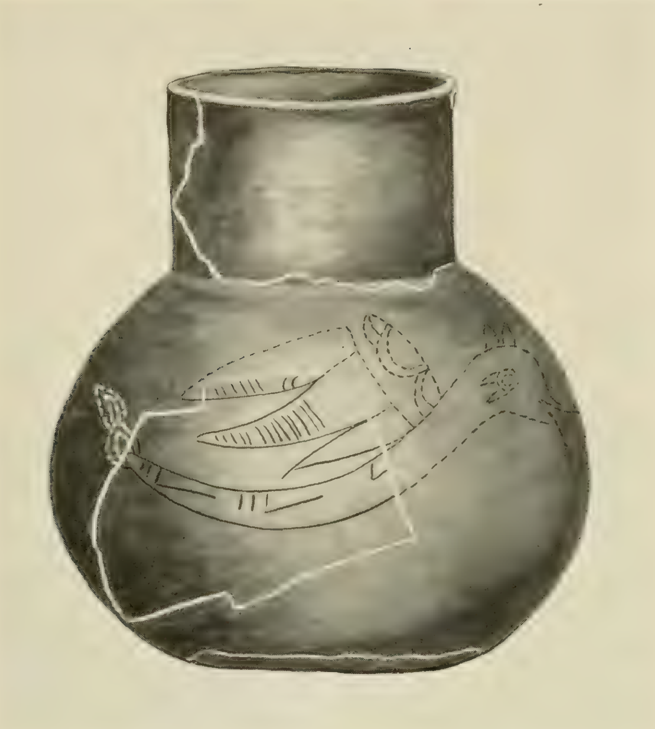
2. Drawing Reproduction of Owl-Effigy Water Bottle. Height, 14,5 Inches; Maximum Diameter, 11.5 Inches. Site Lu° 21.



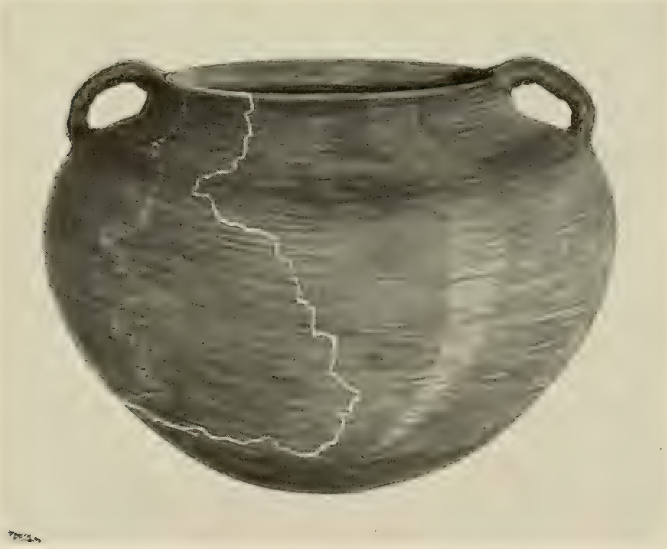
1. Drawing Reproduction of Pot. Height, 6 Inches; Maximum Diameter, 7.25 Inches; Mouth Diameter, 6 Inches. Site Lu° 21.



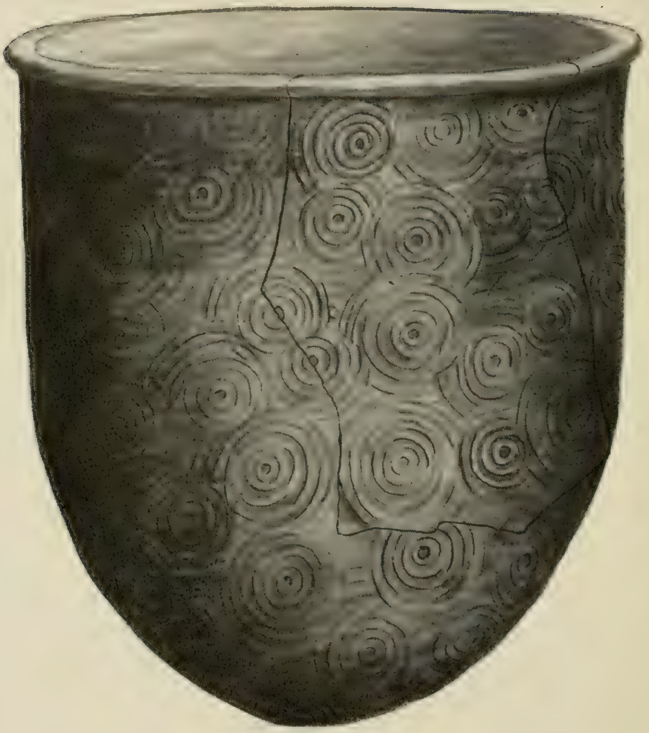
2. Drawing Reproduction of Pot, Height, 5.5 Inches; Maximum Diameter, 8 Inches; Mouth Diameter, 6 Inches. Site Lu° 21.



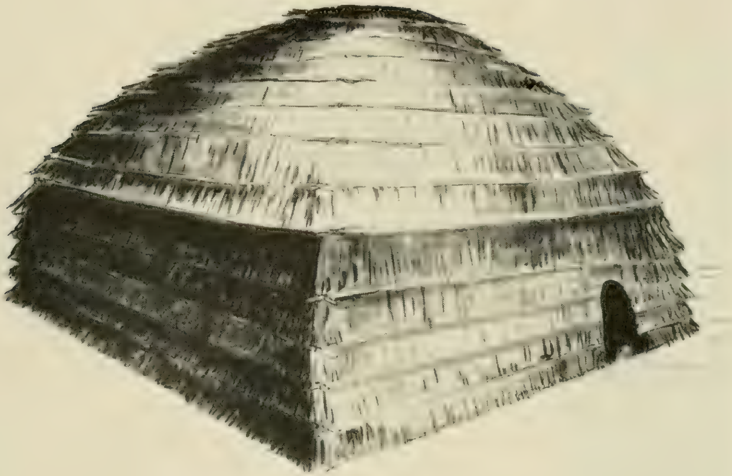
1. DRAWING RESTORATION OF WATER BOTTLE FROM THREE SHERDS FROM GENERAL DIGGING. HEIGHT, 5.75 INCHES; MAXIMUM DIAMETER, 5.25 INCHES; MOUTH DIAMETER, 2.9 INCHES. SITE LU° 21.



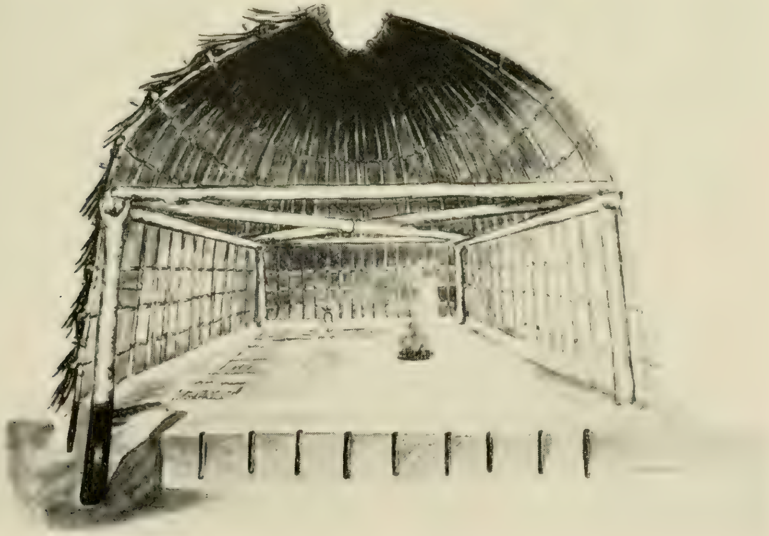
2. DRAWING REPRODUCTION OF POT. HEIGHT, 11 INCHES; MAXIMUM DIAMETER, 15 INCHES; MOUTH DIAMETER, 10 INCHES. SITE LU° 21.



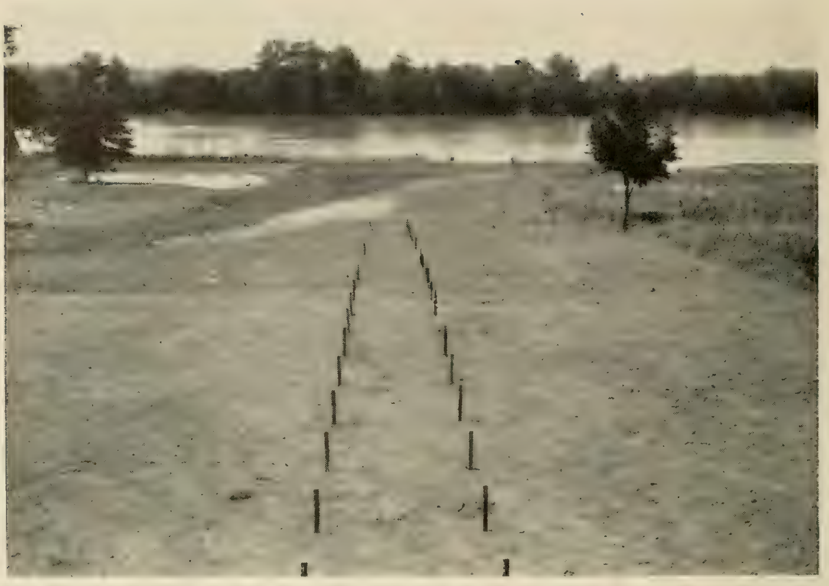
DRAWING RESTORATION OF POT WITH COMPLICATED, STAMPED DECORATION. HEIGHT OF POT, 15 INCHES; MAXIMUM INTERIOR DIAMETER, 13 INCHES. SITE LU°21.



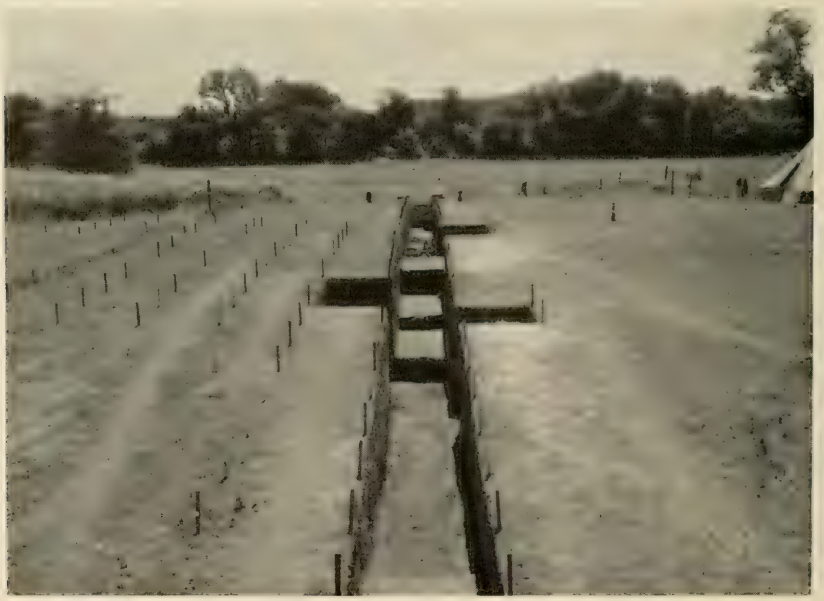
1. DRAWING RECONSTRUCTION, SHOWING OUTSIDE OF STRUCTURE, FEATURE NO. 2. SITE Luº 21.



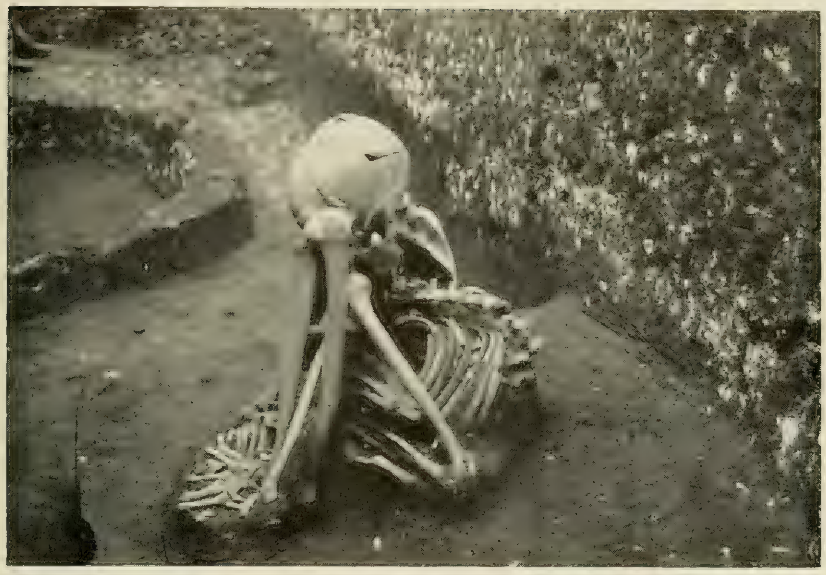
2. DRAWING RECONSTRUCTION, SHOWING INTERIOR OF STRUCTURE, FEATURE NO. 2. SITE Luº 21.



1. VIEW OF SITE LOOKING NORTH AFTER CLEARING AND STAKING PRELIMINARY TRENCH. SITE LU° 25, UNIT 1.

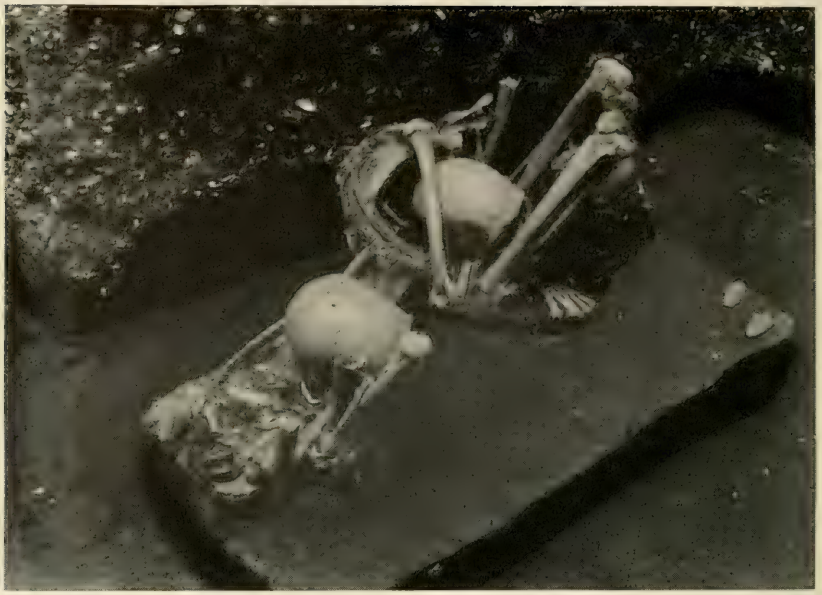


2. VIEW OF "0" CUT. LOWER LEVEL UNDER WATER OWING TO HIGH WATER TABLE. SITE LU° 25, UNIT 1.

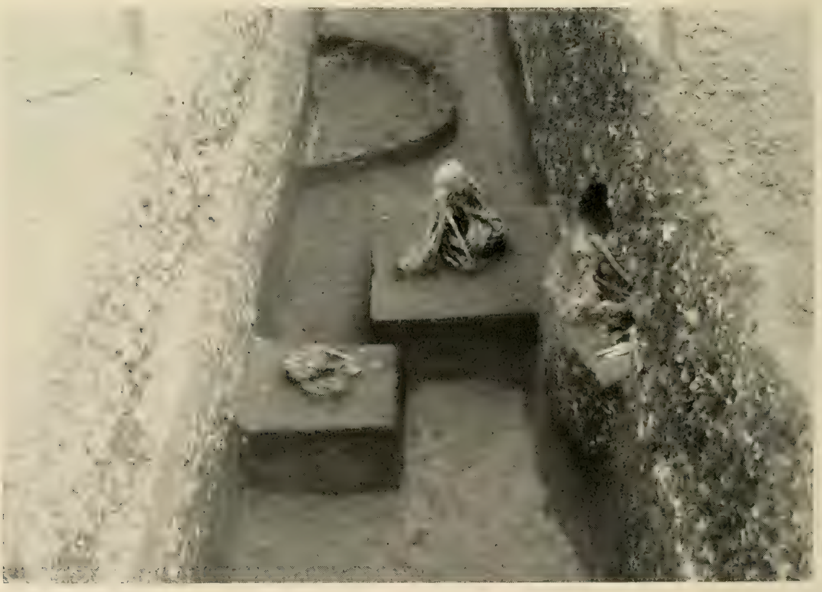


1. BURIAL NO. 11. TYPICAL SITTING BURIAL. SITE LU° 25, UNIT 1.

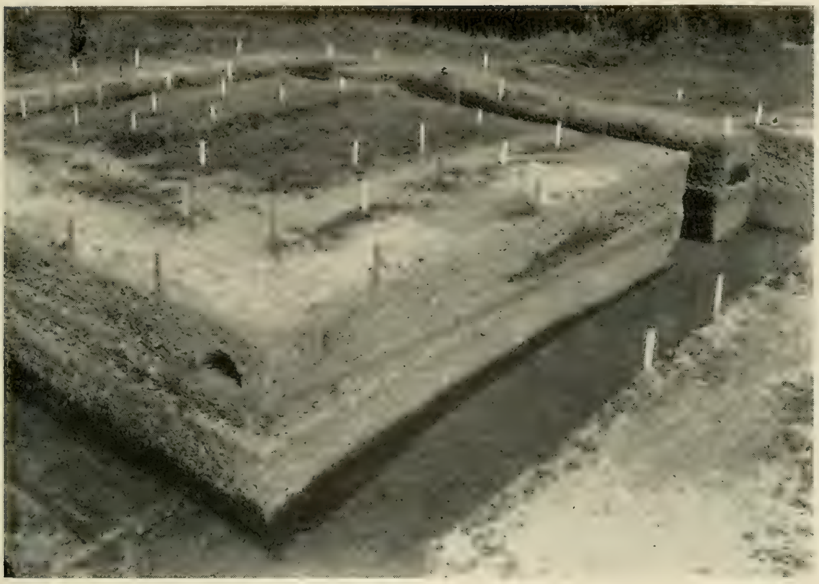
2. SOUTH END OF "0" TRENCH WITH BURIAL IN SITU. SITE LU° 25, UNIT 1.



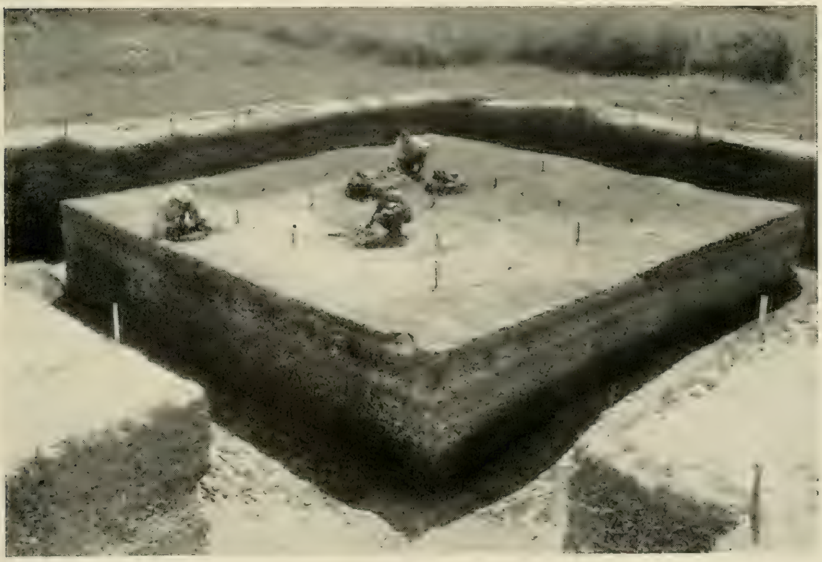
1. BURIALS NOS. 22 (ON LEFT) AND 23 (ON RIGHT). TYPICAL SITTING BURIAL. SITE Lu° 25, UNIT 1.



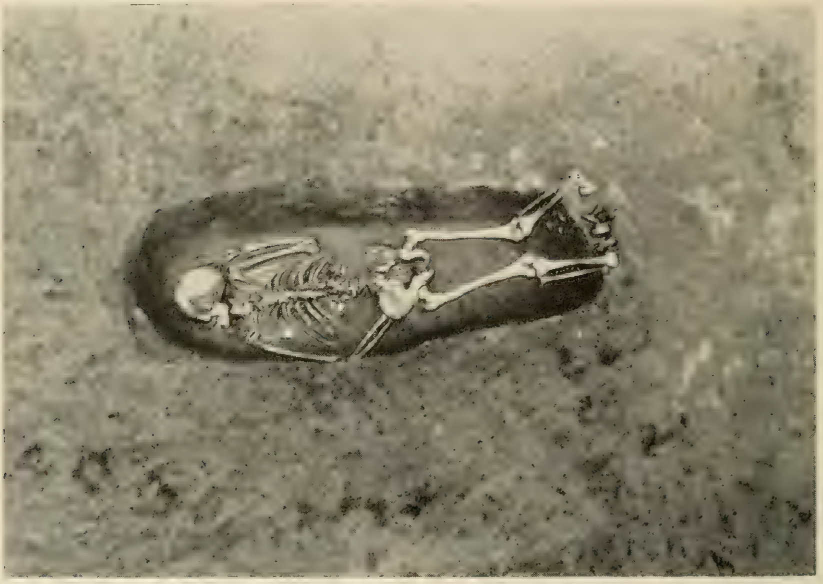
2. MIDDEN PIT, FEATURE NO. 1, UNDER LOWER SHELL LEVEL. SITE Lu° 25, UNIT 1.



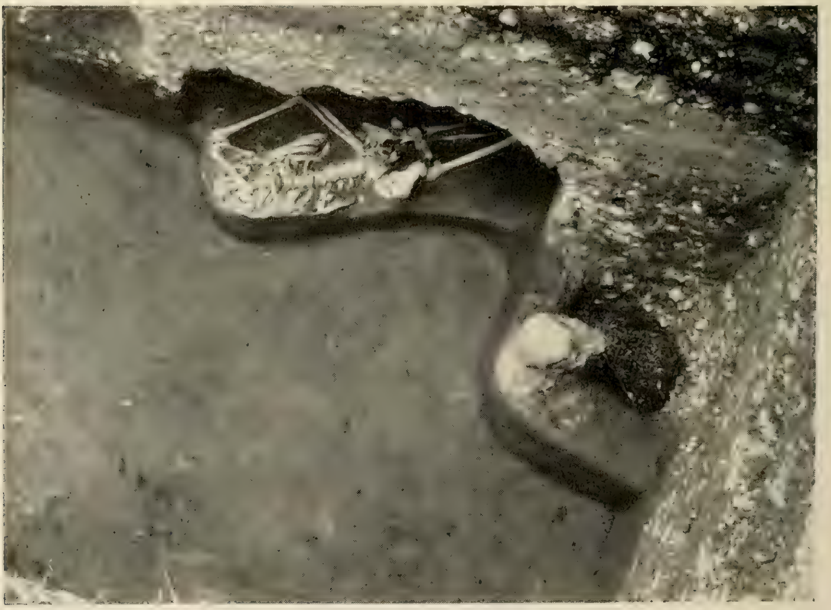
1. VIEW OF BLOCK NO. 1, 30 BY 30 FEET AND PORTION OF L2 PROFILE. SITE LU° 25, UNIT 1.



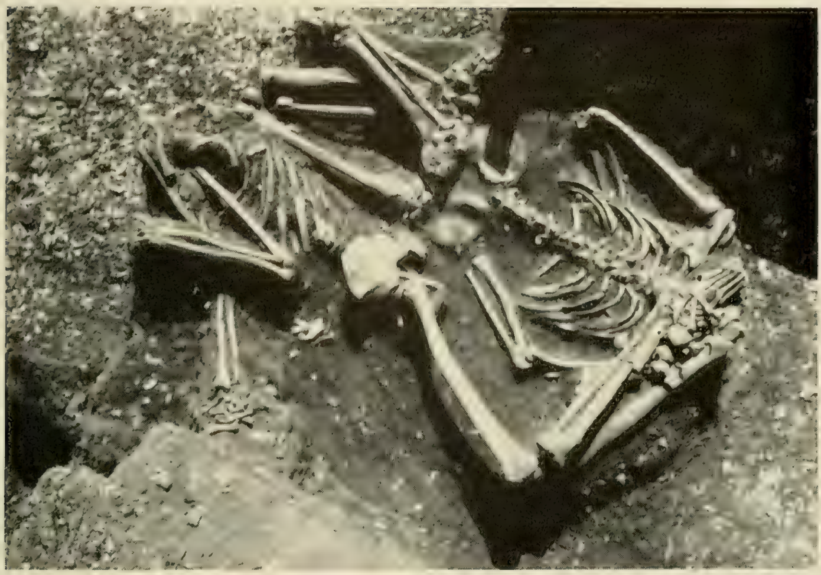
2. BLOCK NO. 1 AT THE 2-FOOT LEVEL, BURIALS BEING EXPOSED. SITE LU° 25, UNIT 1.



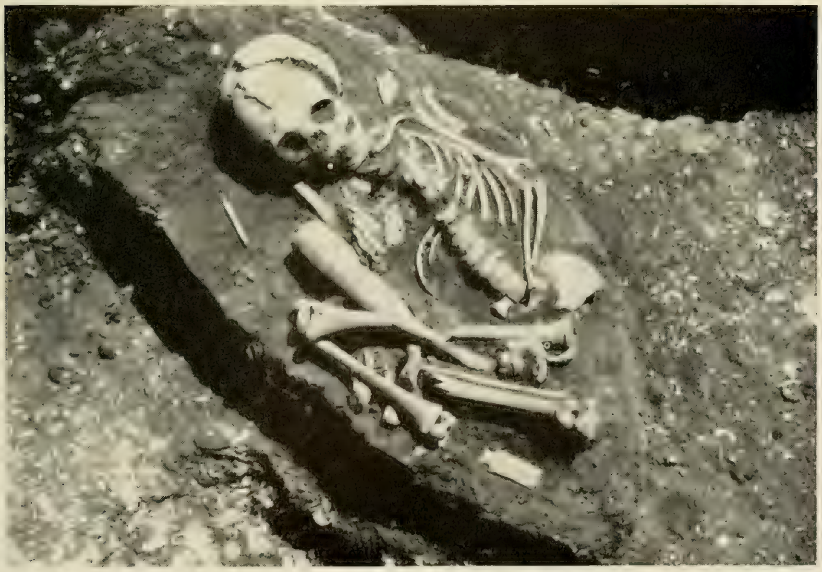
1. BURIAL NO. 38, FACE DOWNWARD IN PIT IN SAND BELOW SHELL MIDDEN. SITE LU° 25, UNIT 1.



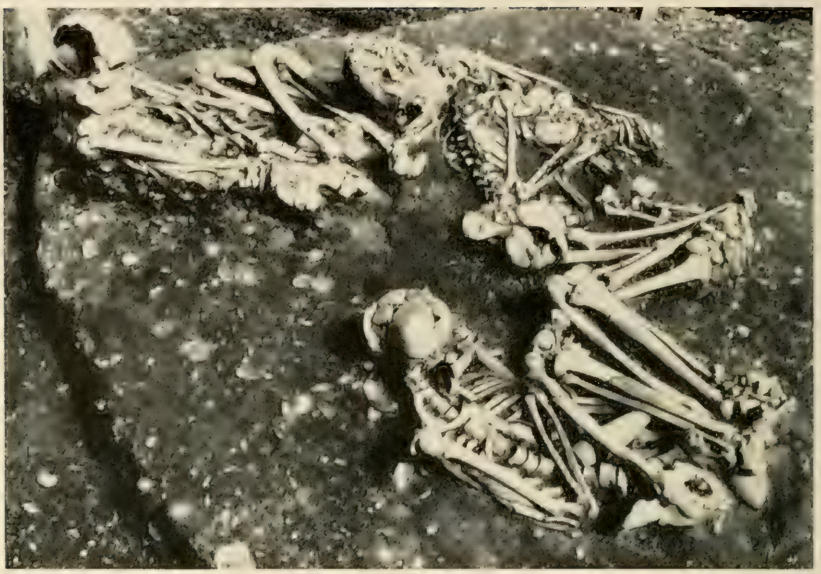
2. BURIAL NO. 62, HEAD DETACHED, 4 FEET FROM BODY. LU° 25, UNIT 1.



1. BURIALS NOS. 2 AND 3, PARTIALLY FLEXED, HEADLESS. SITE Luº 25, UNIT 1.

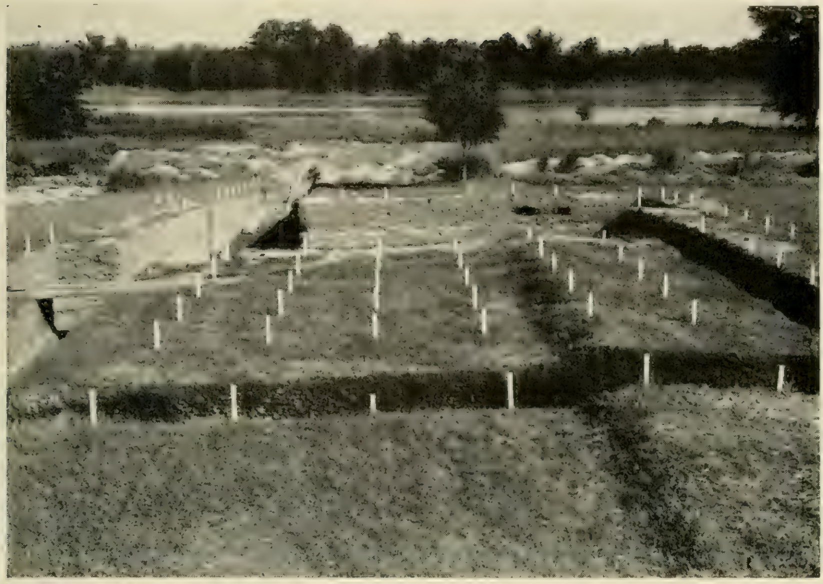


2. BURIAL NO. 4, AN ADOLESCENT WITH LARGE TUBULAR PIPE. SITE Luº 25, UNIT 1.

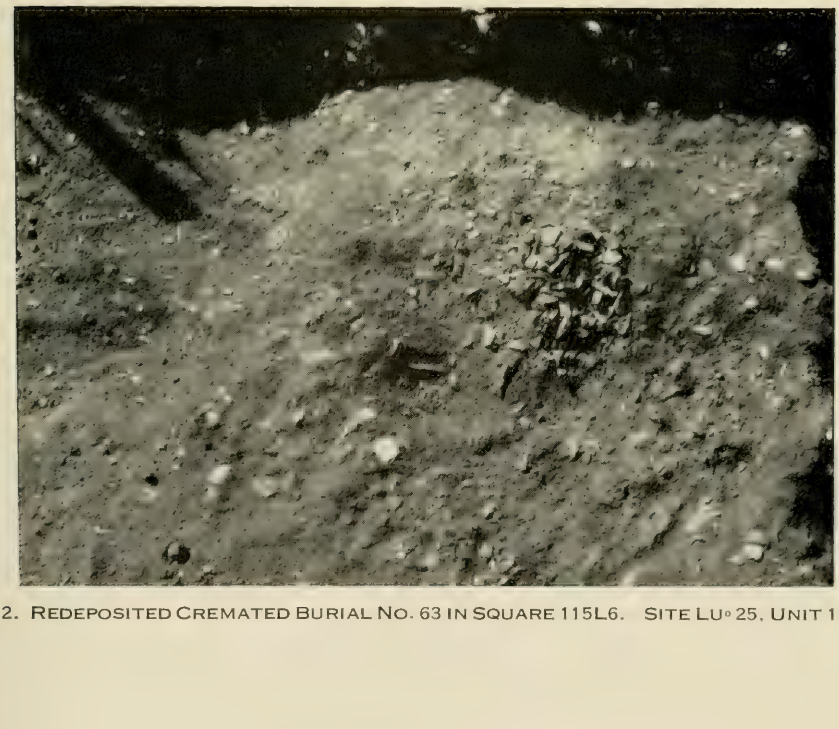


1. Burials Nos. 56, 57, 58, and 59. Large Tubular Pipe With Burial No. 58. Site Lu° 25, Unit 1.

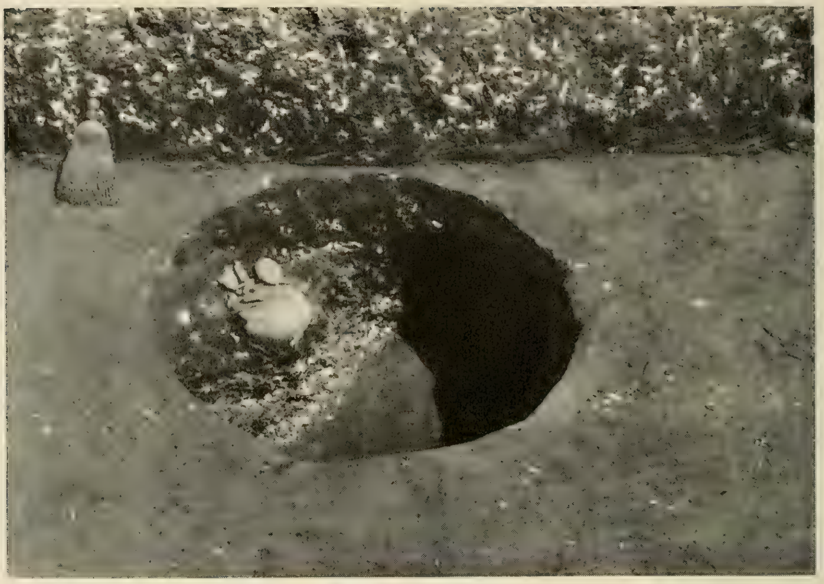
2. Central Block No. 2, Outlined and Ready for Excavation. Site Lu° 25, Unit 1.



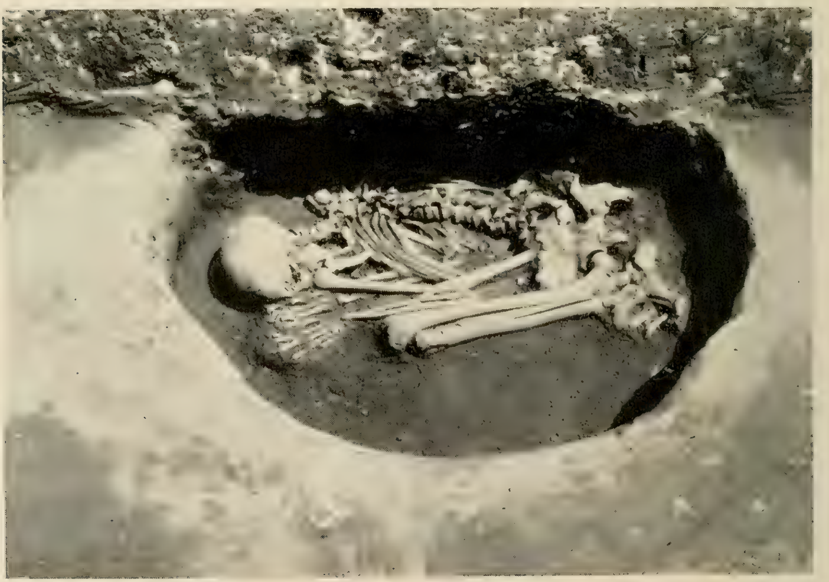
1. CENTRAL BLOCK NO. 2, LOOKING NORTH. SITE LU° 25, UNIT 1.



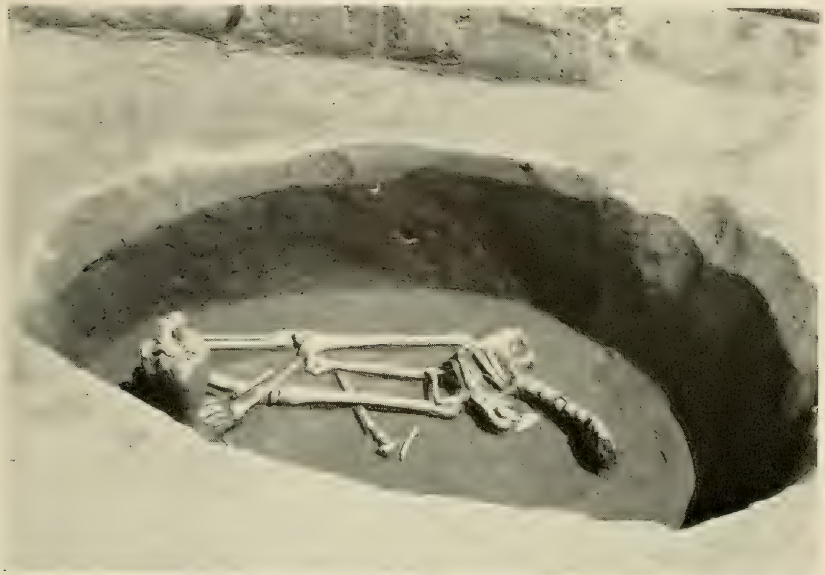
2. REDEPOSITED CREMATED BURIAL NO. 63 IN SQUARE 115L6. SITE LU° 25, UNIT 1.



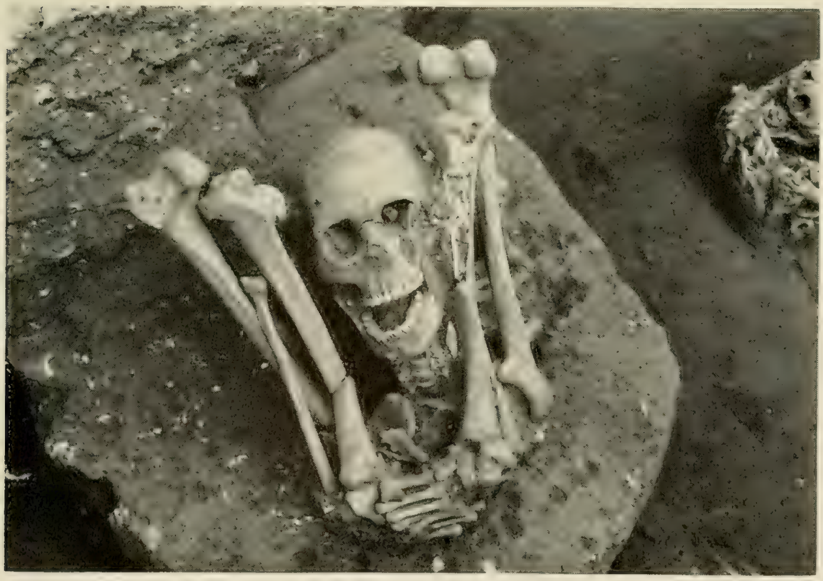
1. MIDDEN PIT, FEATURE NO. 4, CONTENTS PARTLY REMOVED. SITE LU° 25, UNIT 1.



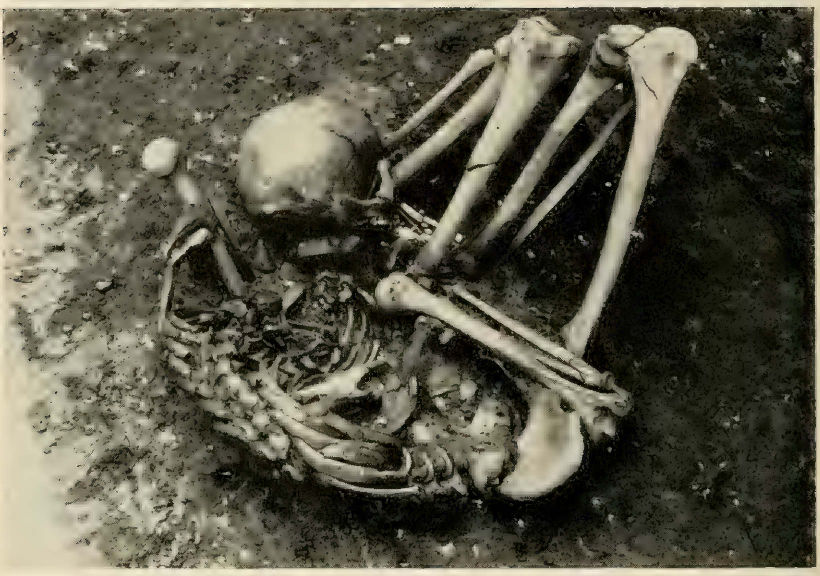
2. BURIAL NO. 73, ROUND GRAVE. SITE LU° 25, UNIT 1.



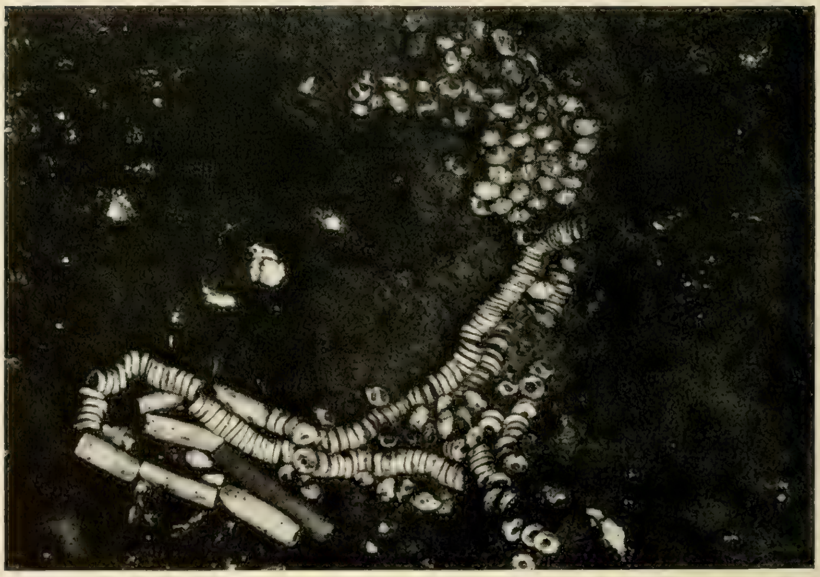
1. BURIAL NO. 66 (DISARTICULATED MEMBERS). SITE Lu° 25, UNIT 1.



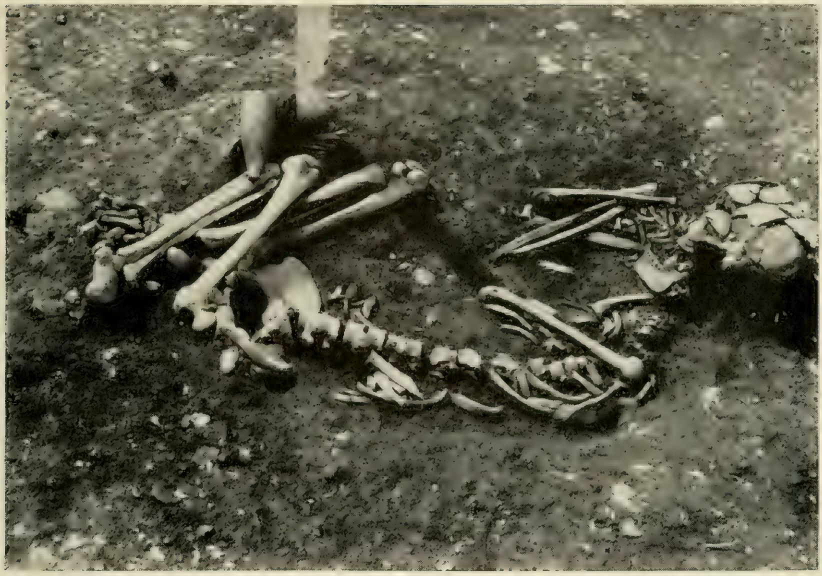
2. SITTING BURIAL NO. 72. SITE Lu° 25, UNIT 1.



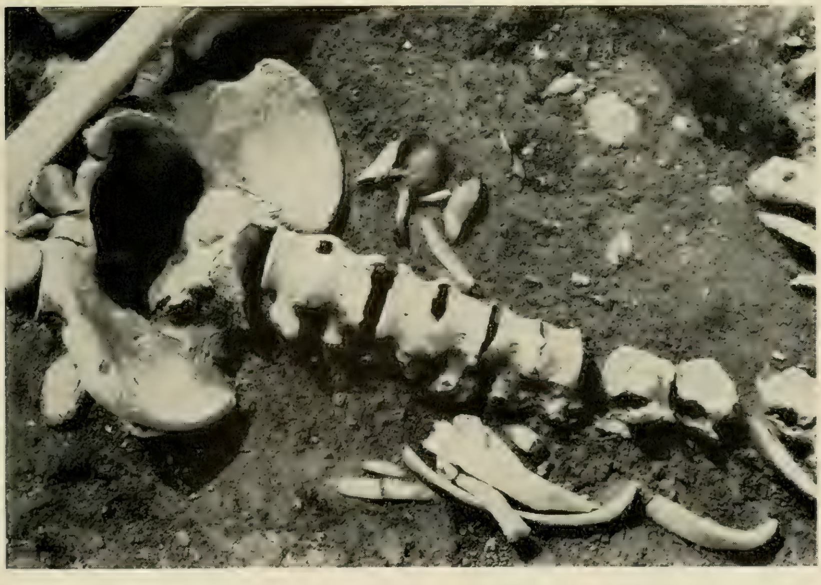
1. Burial No. 76, Stone and Shell Beads. Site Lu° 25, Unit 1.



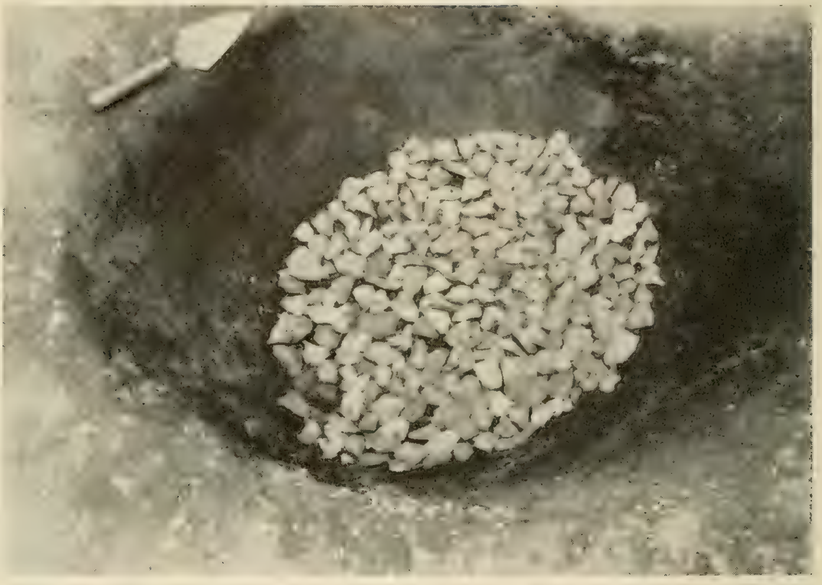
2. Beads Associated With Burial No. 76. Site Lu° 25, Unit 1.



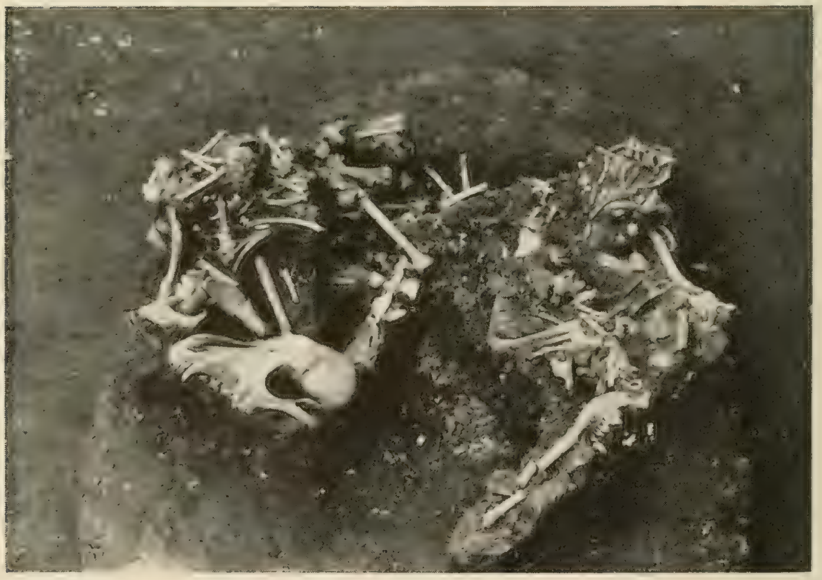
1. BURIAL NO. 84, WITH TUBULAR PIPE. NOTE PATHOLOGICAL VERTEBRAE. SITE LU° 25, UNIT 1.



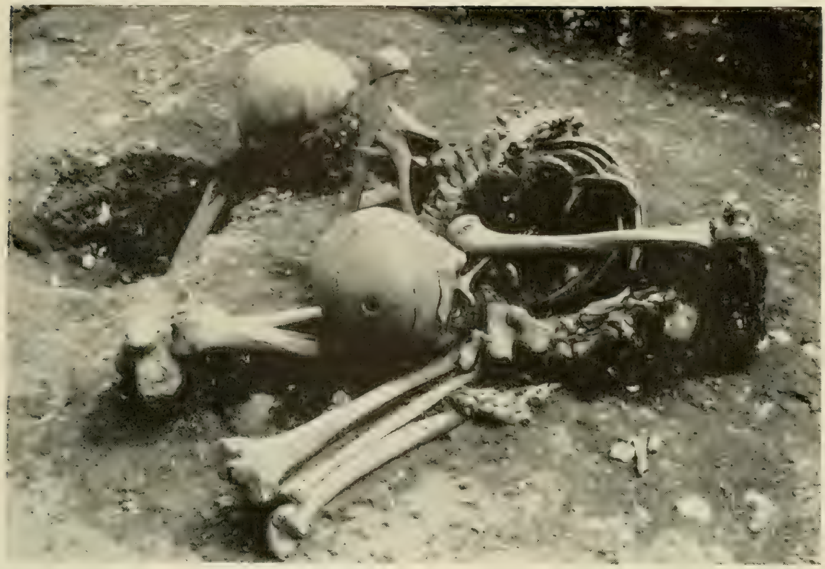
2. PATHOLOGICAL VERTEBRAE, BURIAL NO. 84. SITE LU° 25, UNIT 1.



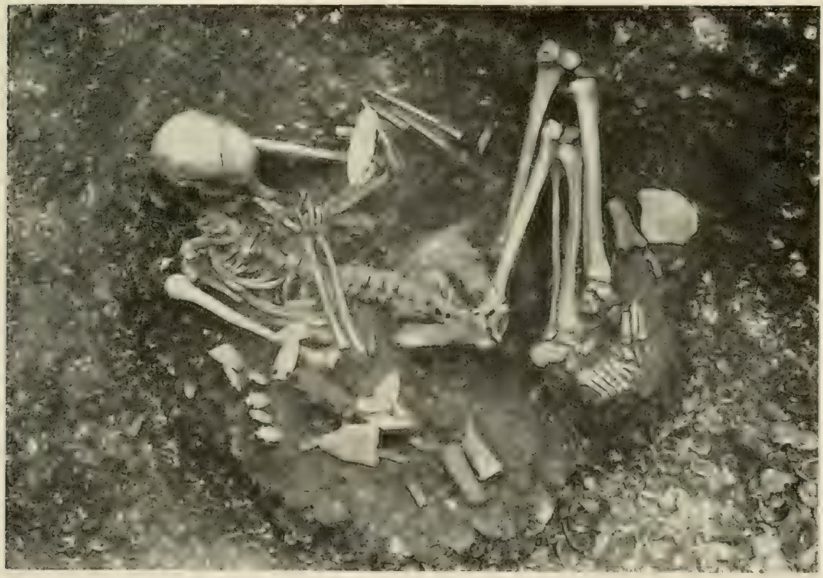
1. FEATURE NO. 7. CREMATORY BASIN. SITE LU° 25, UNIT 1.



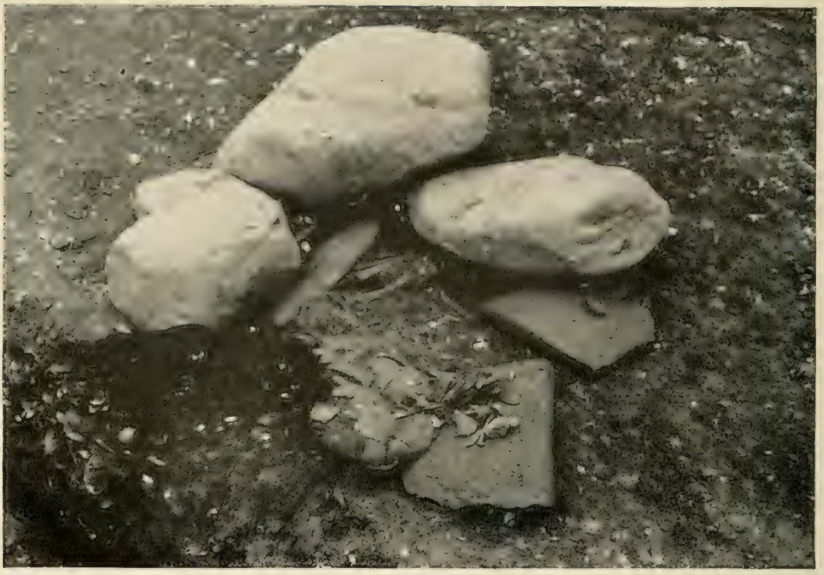
2. TWO DOG SKELETONS DIRECTLY UNDER BURIAL NO. 77. SITE LU° 25, UNIT 1.



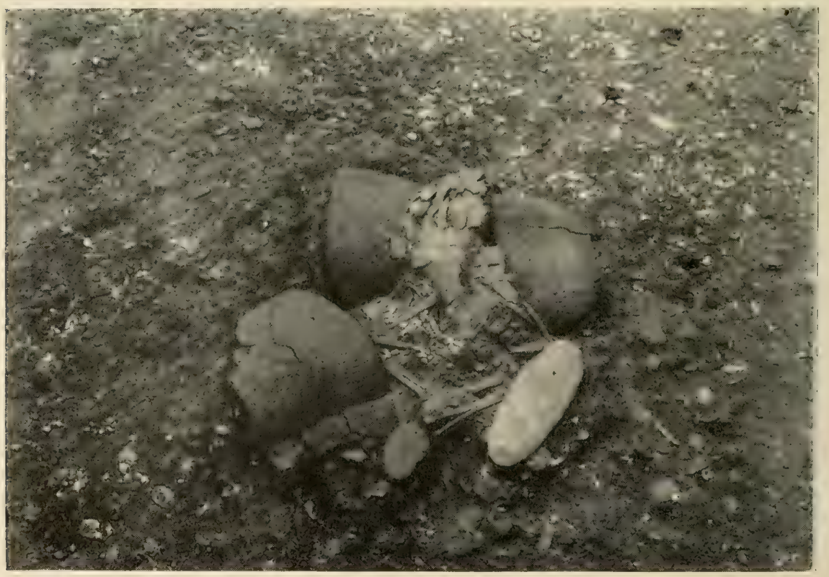
1. BURIAL NO. 86. A SITTING BURIAL WITH HOLE DRILLED IN LEFT PARIETAL. SITE LU° 25, UNIT 1.



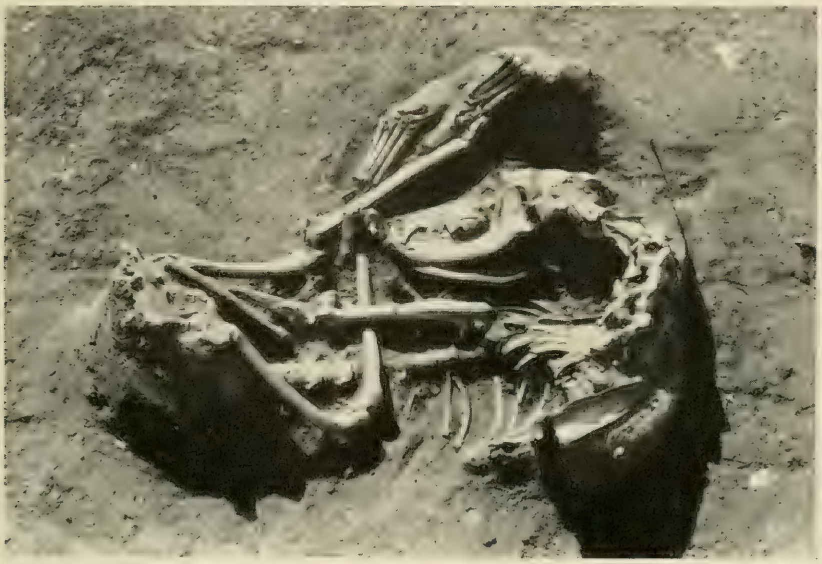
2. BURIAL NO. 92, ACCOMPANIED BY 24 MORTUARY OFFERINGS. SITE LU° 25, UNIT 1.



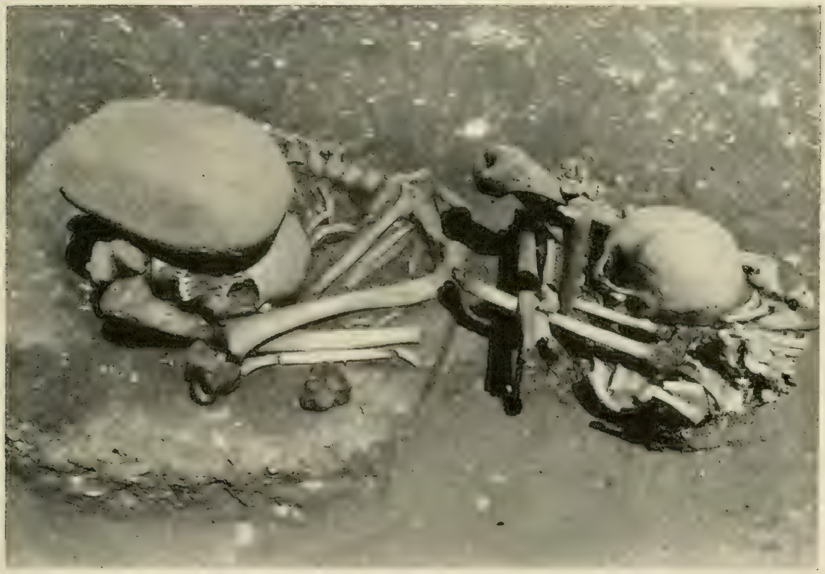
1. BURIAL NO. 90, COVERED WITH LARGE SANDSTONES AND FRAGMENTS OF LARGE STEATITE VESSELS. SITE LU° 25, UNIT 1.



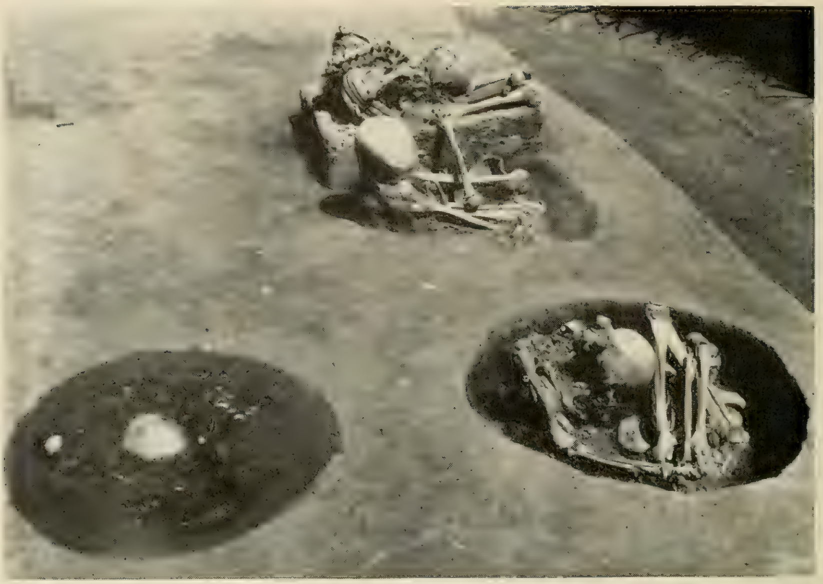
2. BURIAL NO. 90. SANDSTONES REMOVED. SITE LU° 25, UNIT 1.



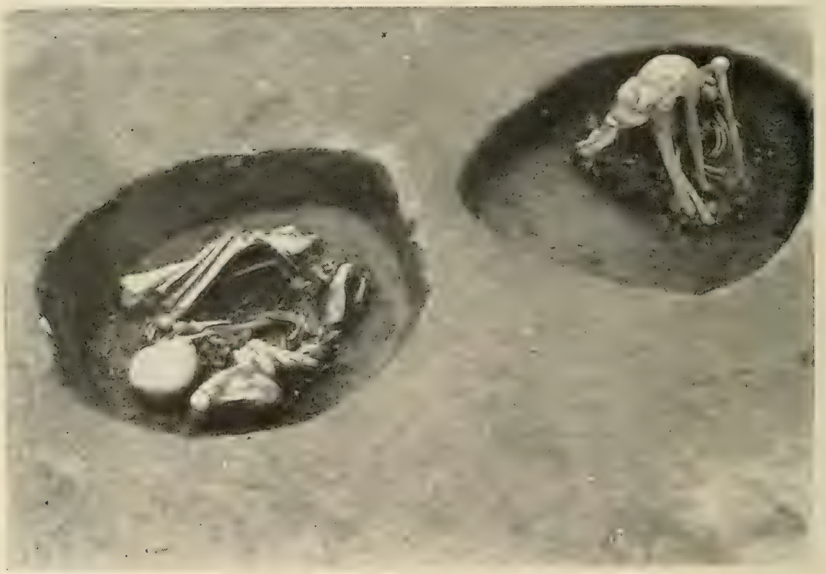
1. Dog Skeleton in Square 100L6, Zone "E," at 5.5-Foot Level. Site Luº 25 Unit 1.



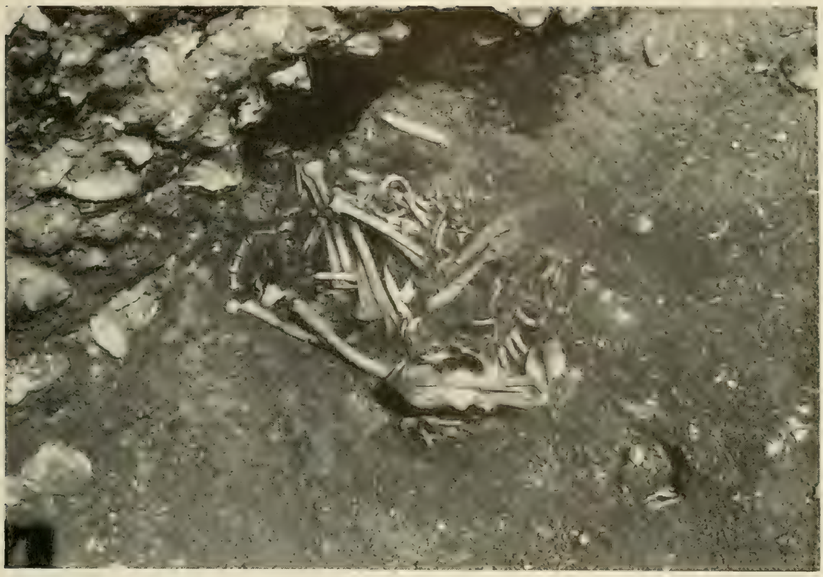
2. Burials Nos. 95 and 96. Site Luº 25, Unit 1.



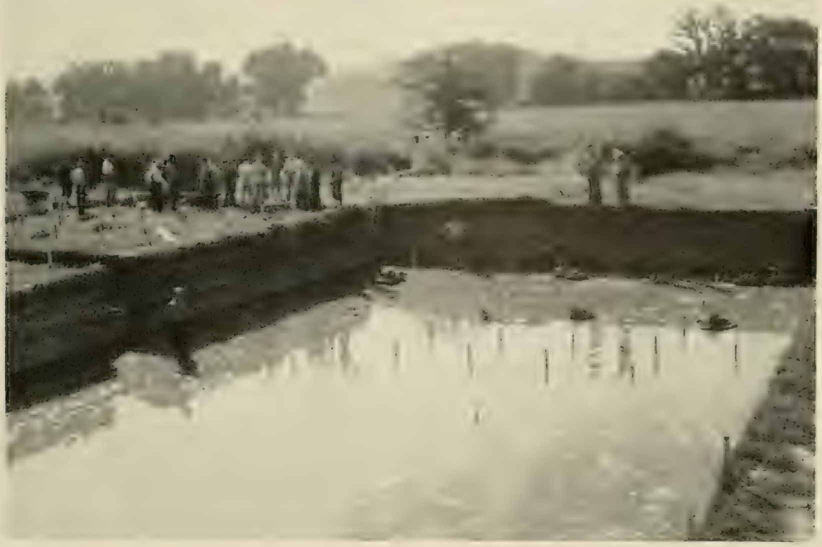
1. BURIALS NOS. 86 AND 87, TWO SITTING BURIALS. BURIAL NO. 100 IN PIT IN FOREGROUND. BURIAL NO. 107, SKULL PARTIALLY EXPOSED. SITE LU° 25, UNIT 1.



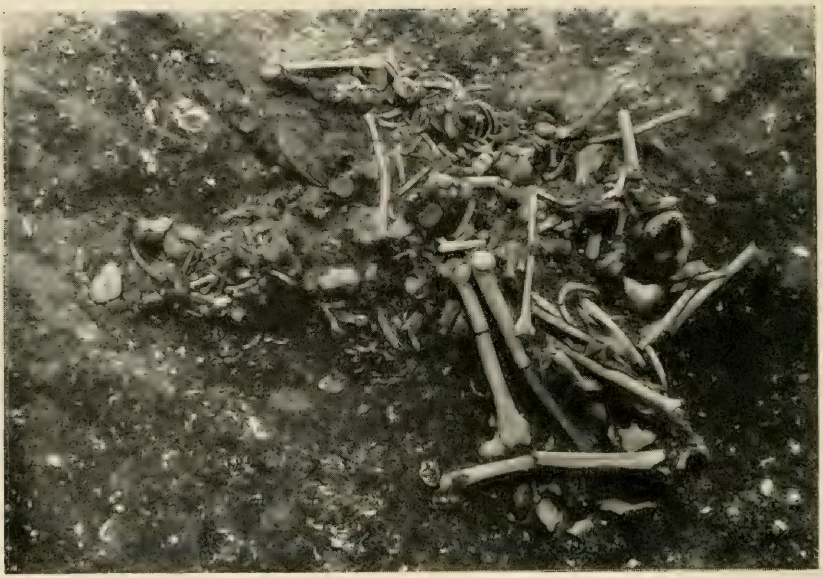
BURIAL NO. 111, SITTING IN SHALLOW PIT; AND BURIAL NO. 112, FLEXED, IN ROUND GRAVE. SITE LU° 25, UNIT 1.



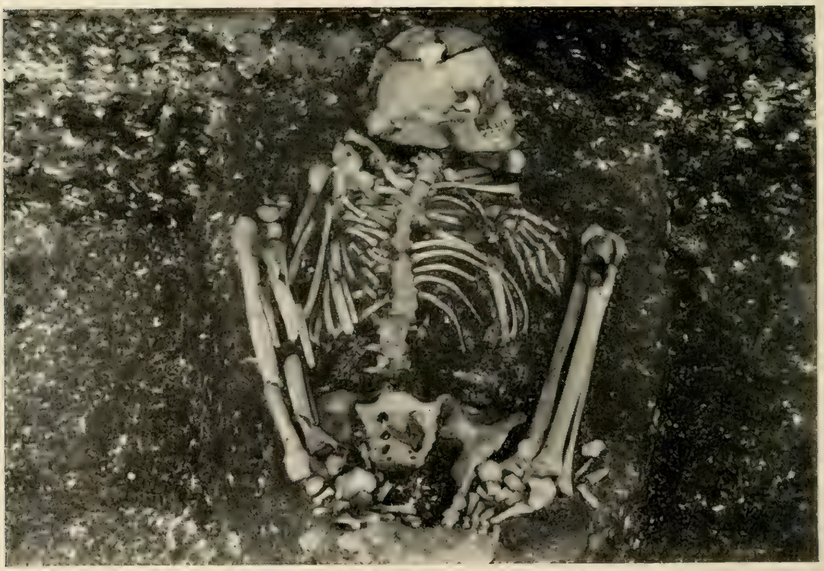
1. DOG BURIAL IN SQUARE 80L11, ZONE "A," 2.4-FOOT LEVEL. SITE LU° 25, UNIT 1.



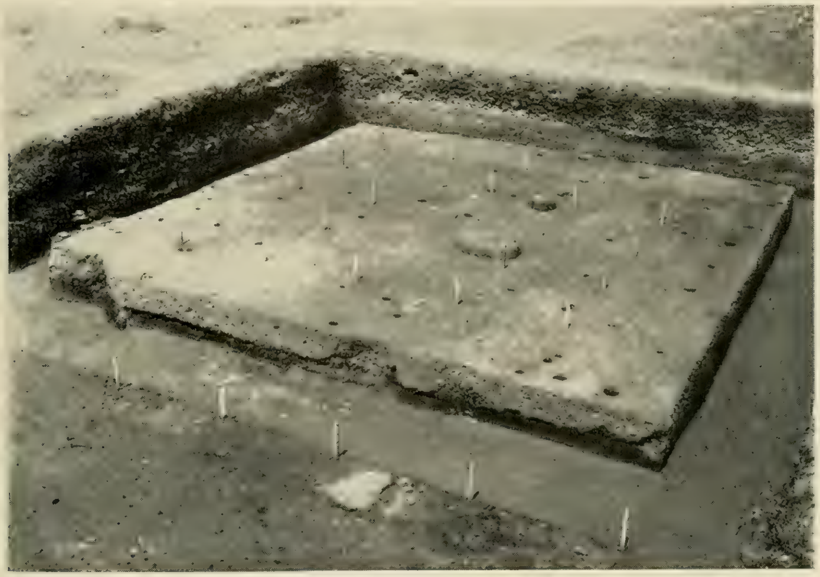
2. STARTING TO OUTLINE BLOCK NO. 3 AFTER ZONE "E" OF BLOCK NO. 2 WAS COVERED BY BACK WATER DURING FLOOD STAGE OF TENNESSEE RIVER. NOTE SITTING BURIALS STILL ABOVE FLOOD WATER. SITE LU° 25, UNIT 1.



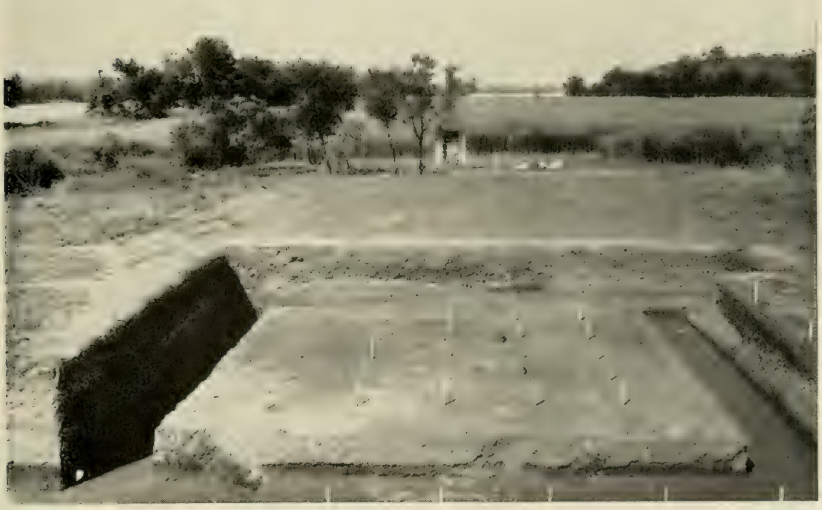
1. A Reburial of Disarticulated Bones of Seven Individuals; Two Infants, One Adolescent, and Four Adults. Site Lu° 25, Unit 1.



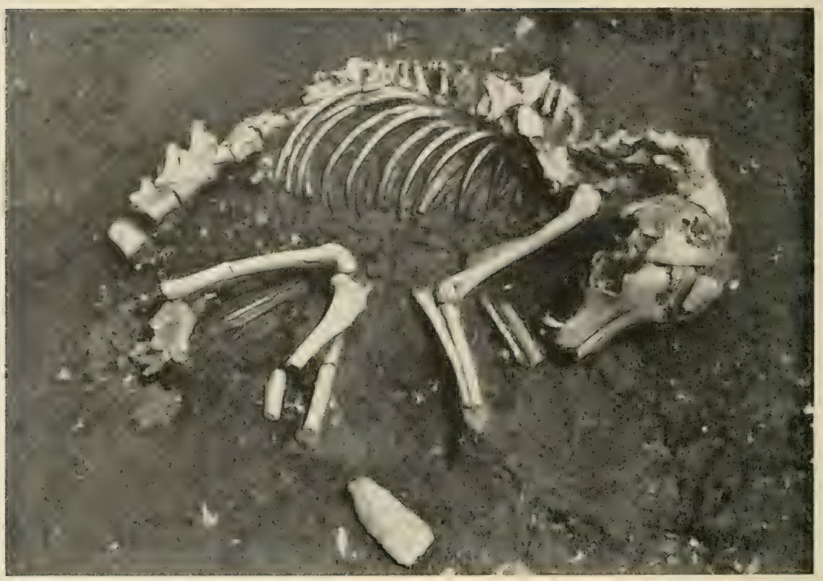
2. Burial No. 126. Site Lu° 25, Unit 1.



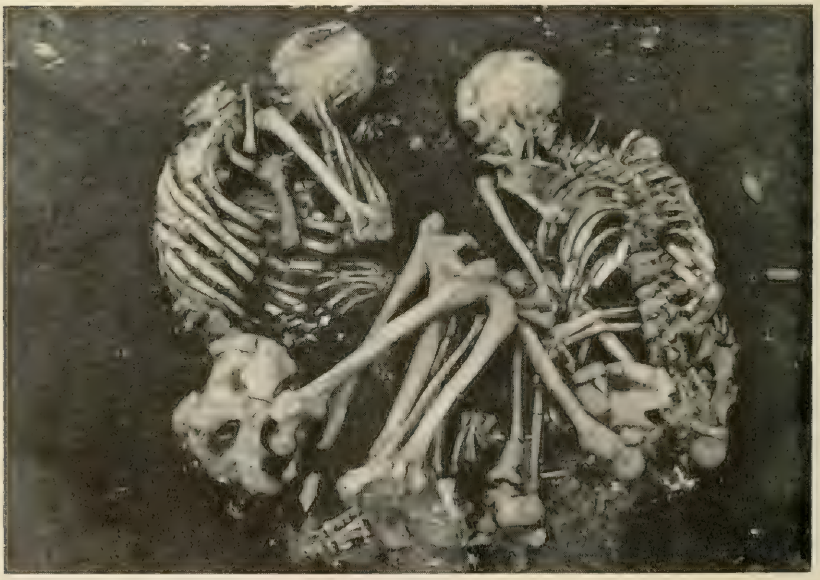
1. Occupational Level; Post Molds, Feature No. 19. Top of Zone B, Block 3. Site Lu° 25, Unit 1.



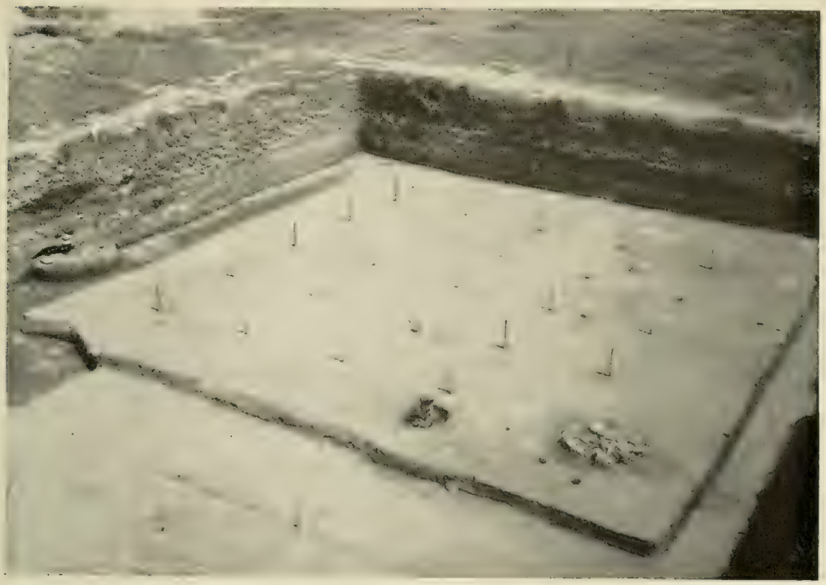
2. Block 3 and Mound, Looking East, Showing 115-Foot Cut (on Right) to be Extended Eastward, Through Center of Mound. Site Lu° 25, Unit 1.



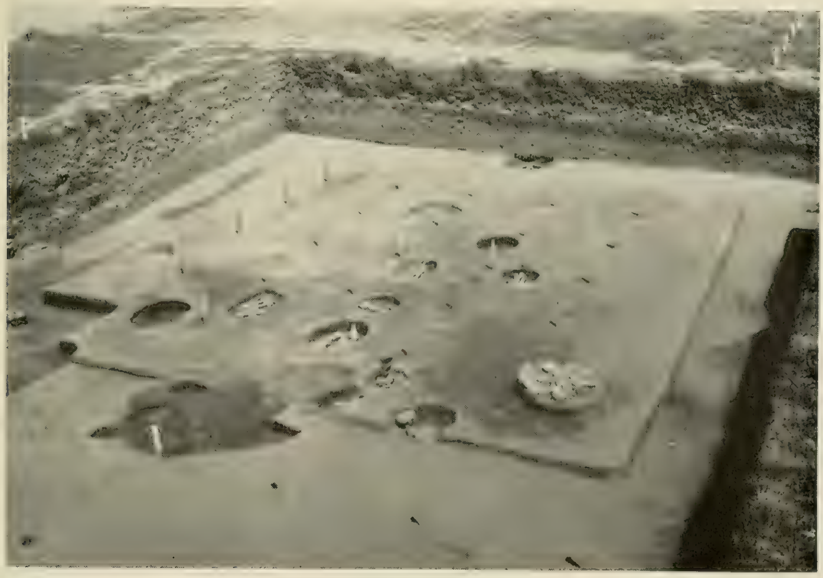
1. Dog Burial in Square 100L10 at 5.5-Foot Level. Site Lu° 25, Unit 1.



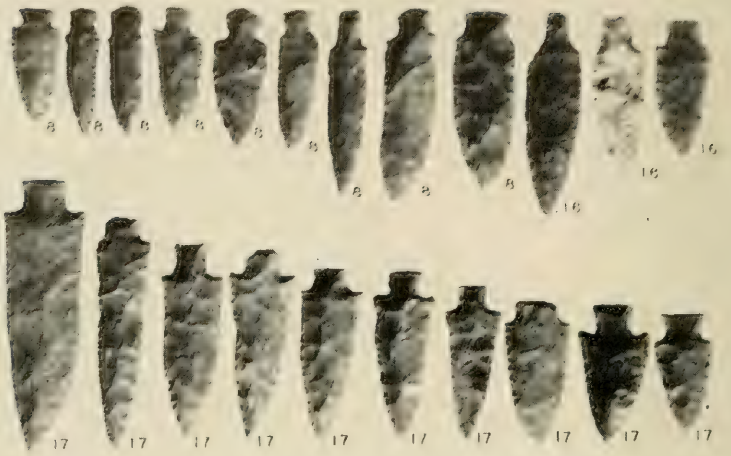
2. Burials Nos. 130 and 131. Site Lu° 25, Unit 1.



1. SILT ZONE, BLOCK NO. 3, SHOWING BURIALS NOS. 130 AND 131, BURIAL NO. 132, AND TWO DOG BURIALS. MANY UNOPENED PITS SHOWN BY FILL OF SHELL. SITE LU° 25, UNIT 1.



2. BURIAL PITS OPENED. SILT ZONE, BASE OF BLOCK NO. 3. SITE LU° 25, UNIT 1.


8
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16
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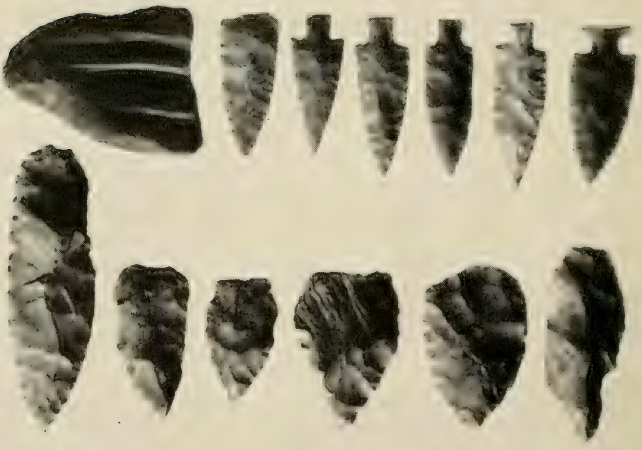
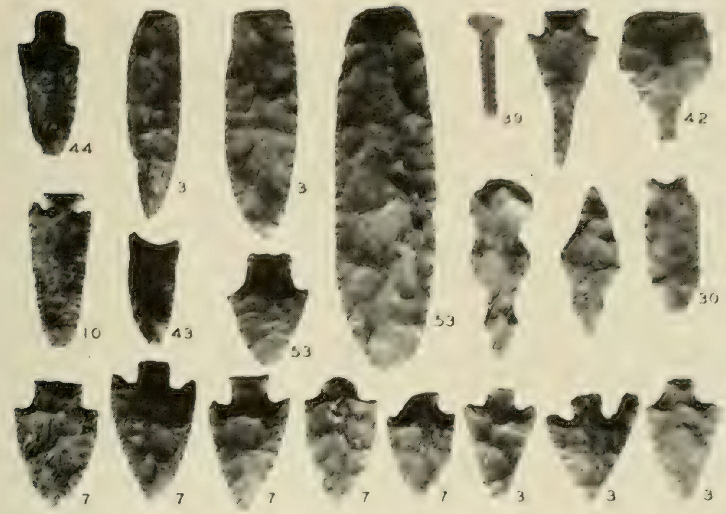
17

1. FLINT TYPES 8, 16, AND 17. SITE LU° 25, UNIT 1.



2. FLINT ARTIFACTS WITH BURIAL NO. 92. SITE LU° 25, UNIT 1.


44
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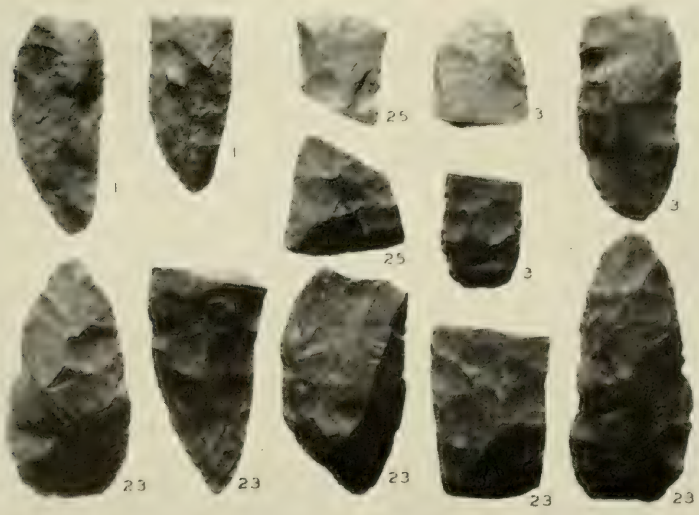
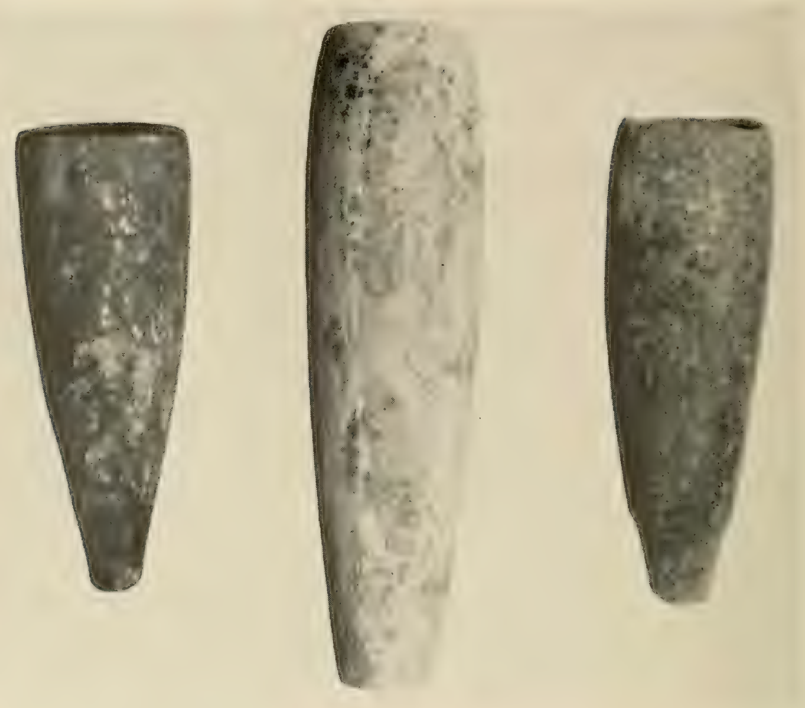
3
39
42
10
43
53
53
30
7
7
7
7
7
3
3
3

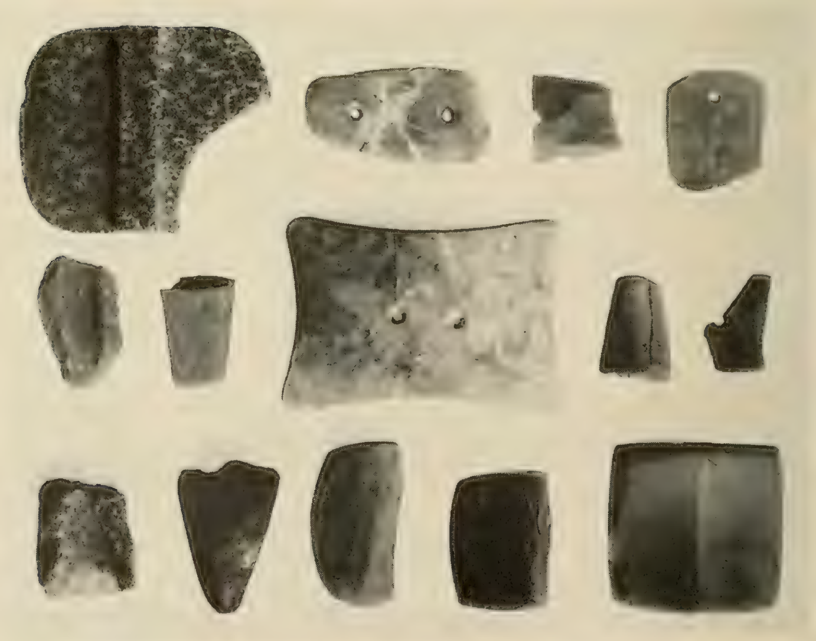
1. FLINT TYPES 3, 7, AND OTHERS. SITE Lu° 25, UNIT 1.


1
1
25
3
3
25
3
23
23
23
23
23

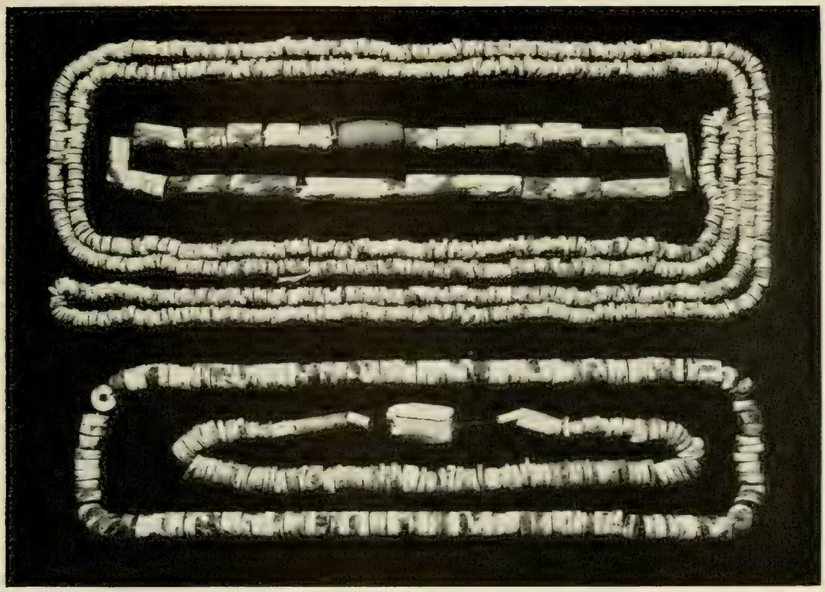
2. FLINT TYPES 23, 25, AND OTHERS. SITE Lu° 25, UNIT 1



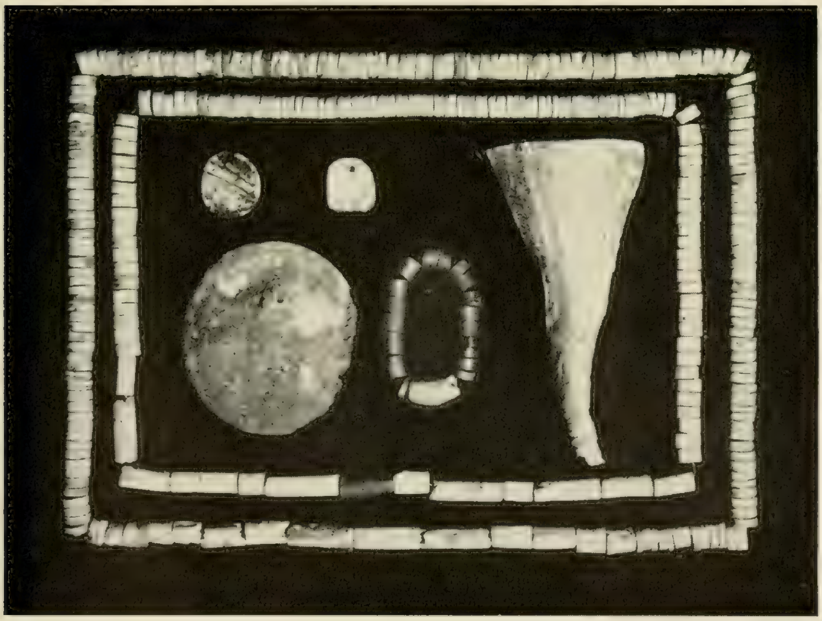
1. TUBULAR PIPES. SITE LU° 25, UNIT 1.



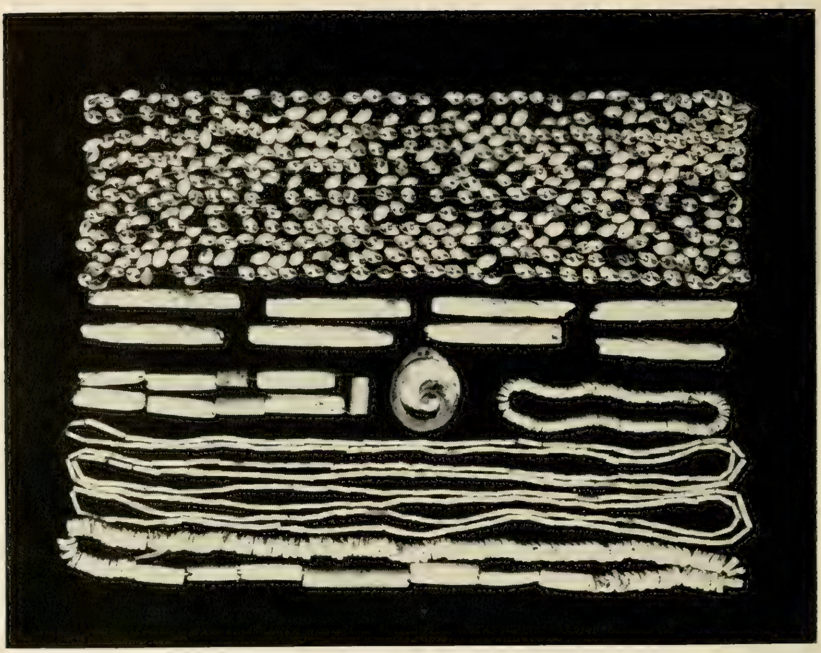
2. STONE GORGETS, BANNER STONE, AND ATLATL WEIGHTS. SITE LU° 25, UNIT 1.



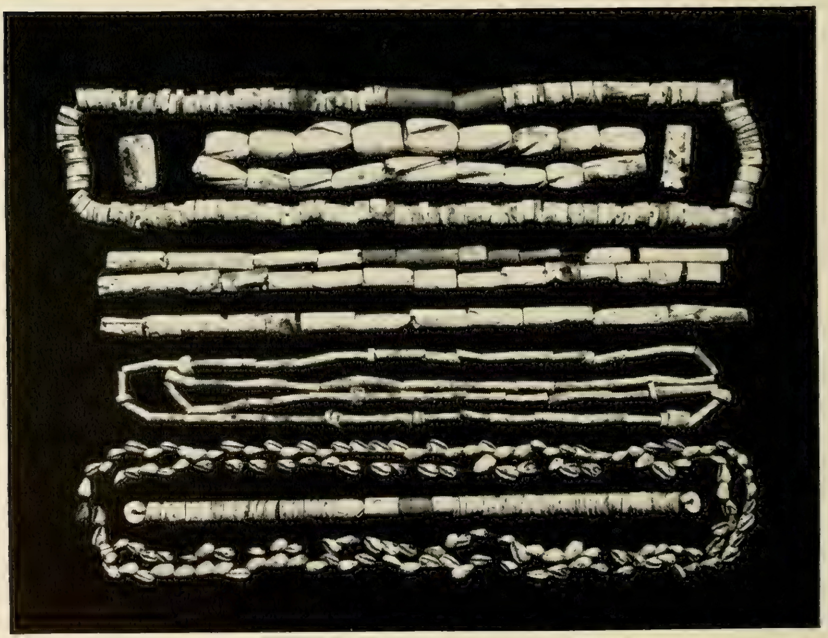
1. SHELL BEADS FROM BURIALS, 1,120 IN ONE STRING. SITE Lu° 25, UNIT 1.



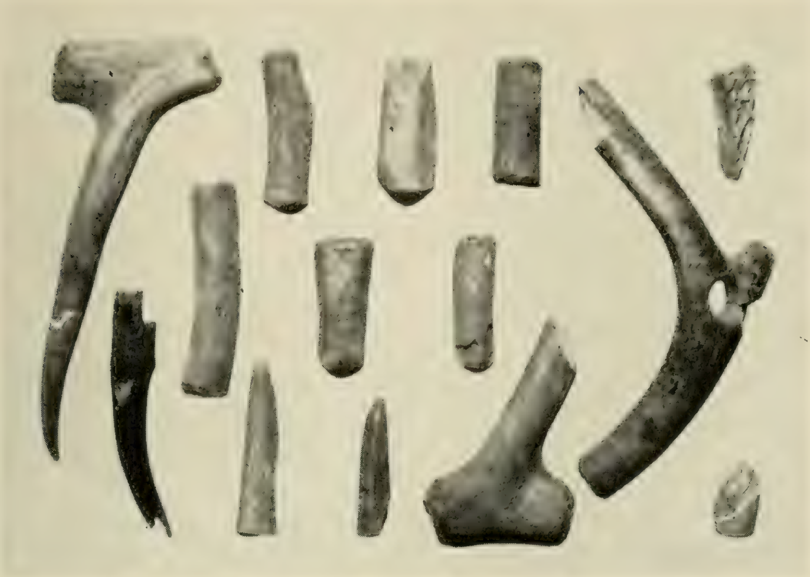
2. SHELL BEADS FROM BURIAL ASSOCIATION. SITE Lu° 25, UNIT 1.



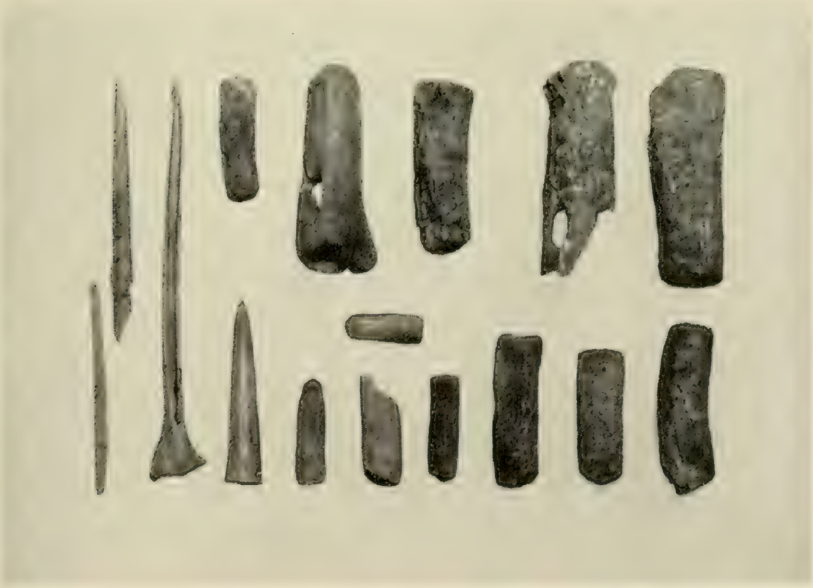
1. SHELL BEADS FROM BURIAL ASSOCIATION. SITE Lu° 25, UNIT 1.



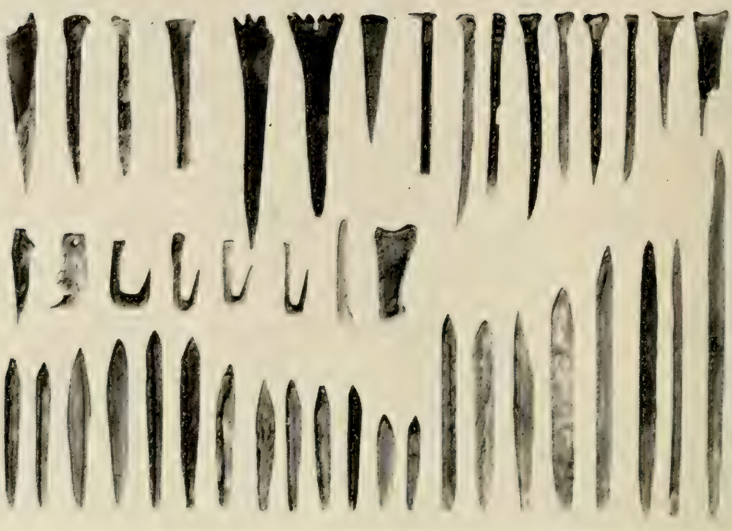
2. SHELL BEADS FROM BURIAL ASSOCIATION. SITE Lu° 25, UNIT 1.



1. ANTLER ARTIFACTS WITH BURIAL NO. 92. SITE Lu° 25, UNIT 1.

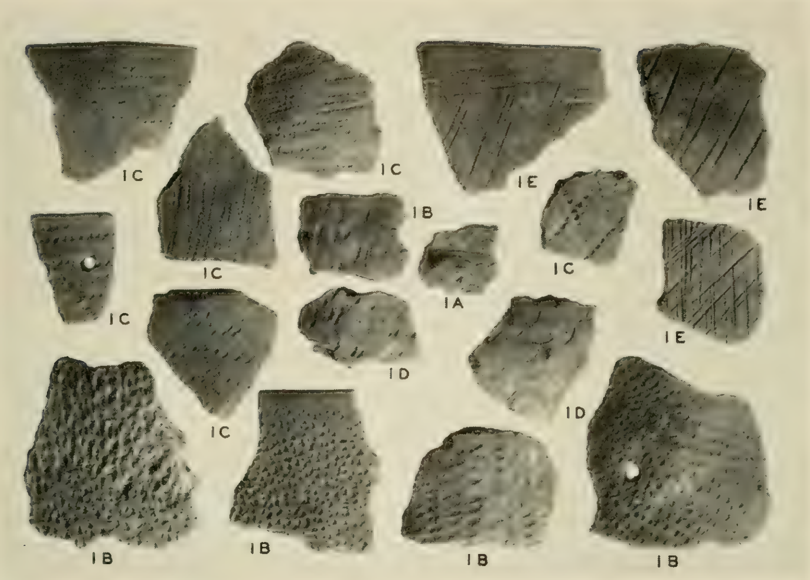


2. ANTLER ARTIFACTS WITH BURIAL NO. 92. SITE Lu° 25, UNIT 1.

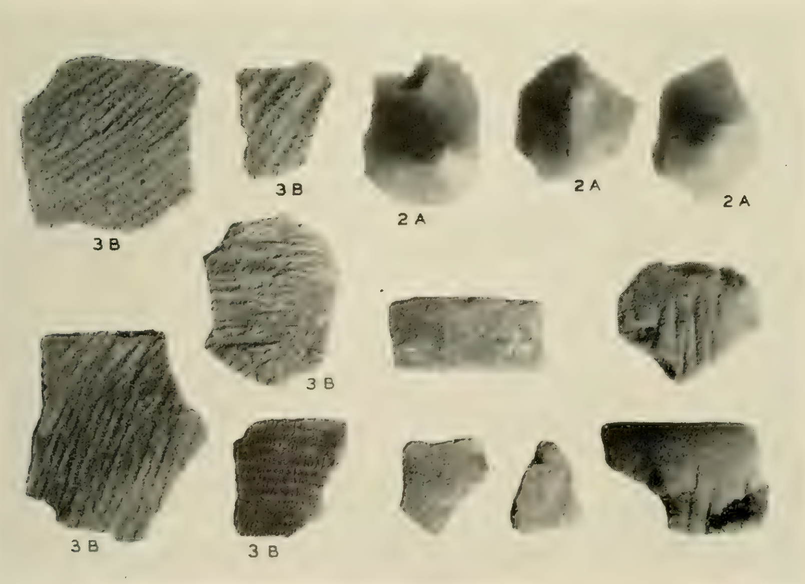


1. BONE NEEDLES, AWLS, FISHHOOKS, AND PROJECTILE POINTS. SITE LU° 25, UNIT 1.

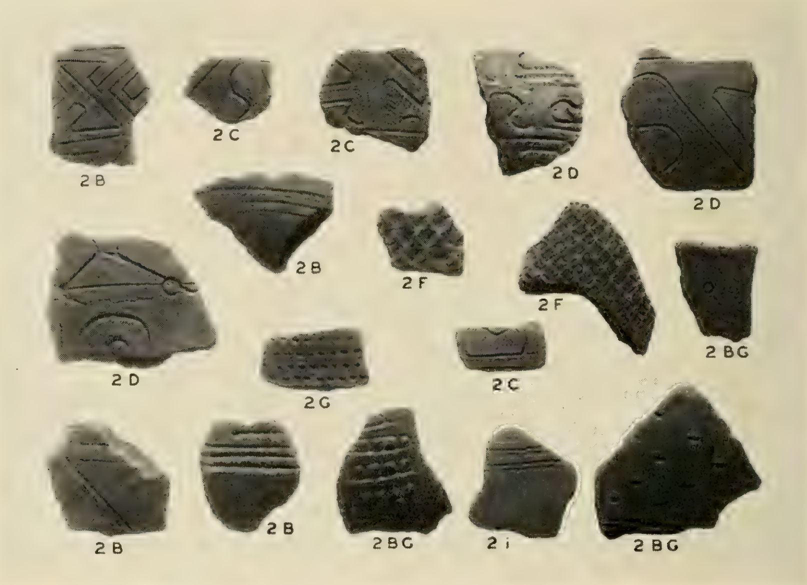
2. STEATITE VESSEL WITH BURIAL NO. 90. SITE LU° 25, UNIT 1.


1 C
1 C
1 E
1 E
1 C
1 B
1 C
1 C
1 A
1 C
1 E
1 C
1 D
1 D
1 B
1 B
1 B
1 B

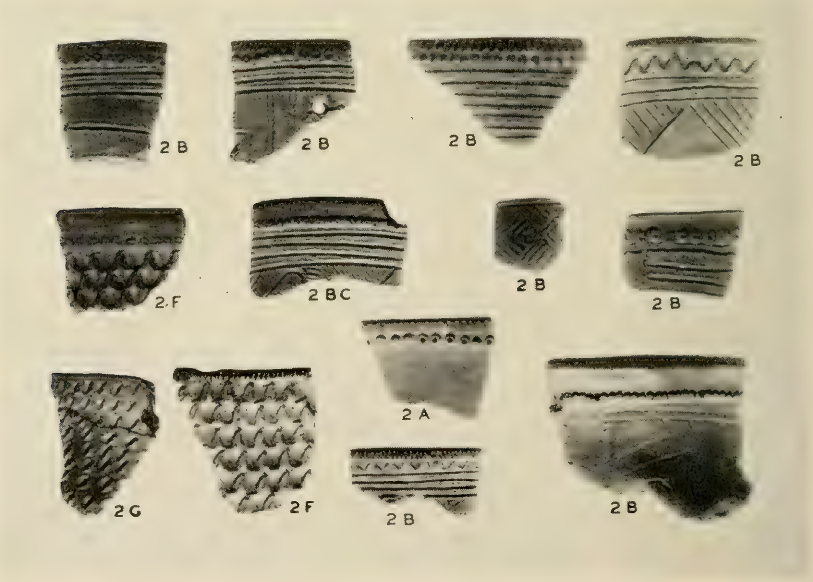
1. Fiber-Tempered Sherds. Site Lu° 25, Unit 1.


3 B
3 B
2 A
2 A
2 A
3 B
3 B
3 B

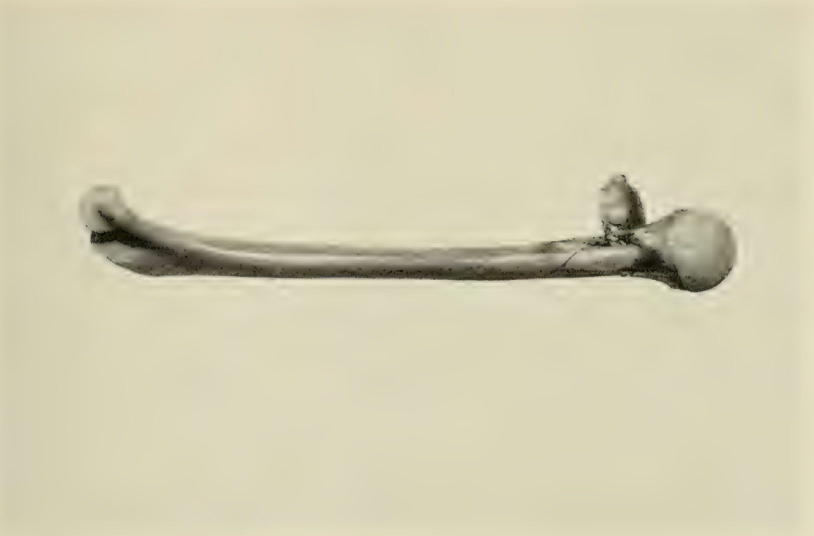
2. Clay-Grit-Tempered Sherds, Sand-Tempered Legs of Vessels, and Sandstone Sherds. Site Lu° 25, Unit 1.


2 C
2 C
2 B
2 D
2 D
2 B
2 F
2 F
2 BG
2 D
2 C
2 G
2 B
2 B
2 BG
2 i
2 BG

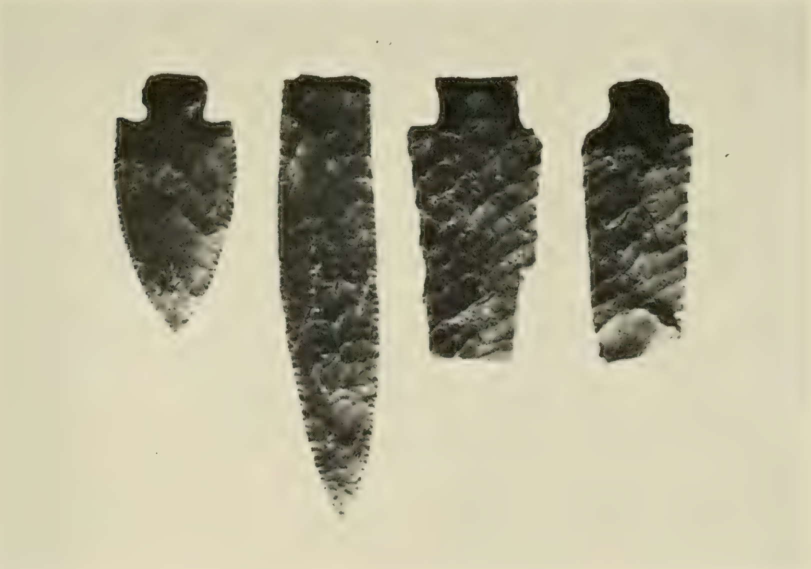
1. Body Sherds of Sand-Tempered Vessels. Site Lu° 25, Unit 1.


2 B
2 B
2 B
2 B
2 F
2 BC
2 B
2 B
2 A
2 G
2 F
2 B
2 B

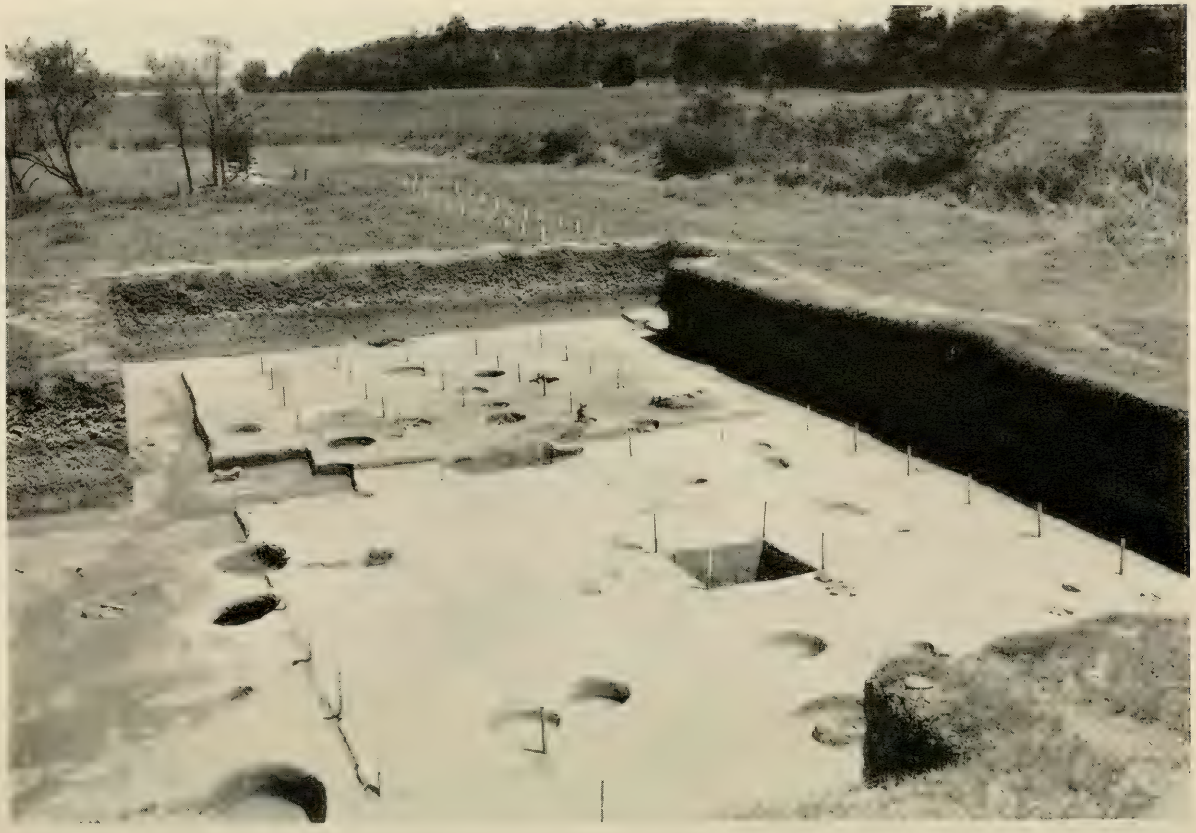
2. Rim Sherds of Sand-Tempered Vessels. Site Lu° 25, Unit 1.



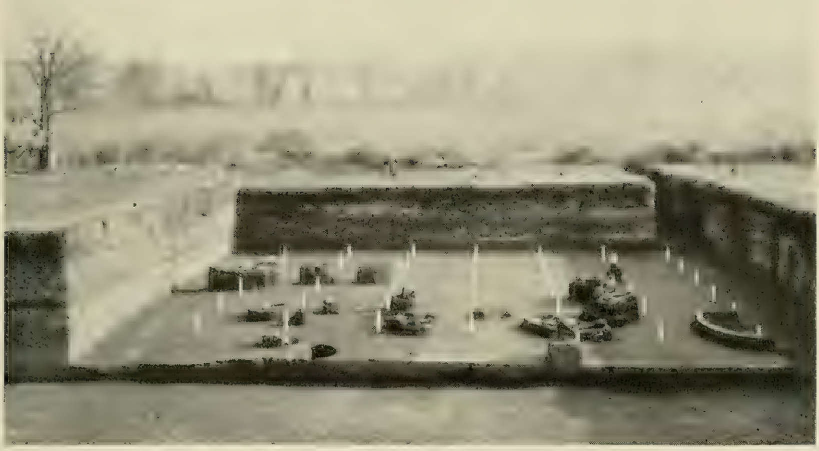
1. Flint Point Imbedded in Right Humerus, Burial No. 2. Site Lu° 25, Unit 1.



2. Illustrating High Art in Flint Chipping. Site Lu° 25, Unit 1.

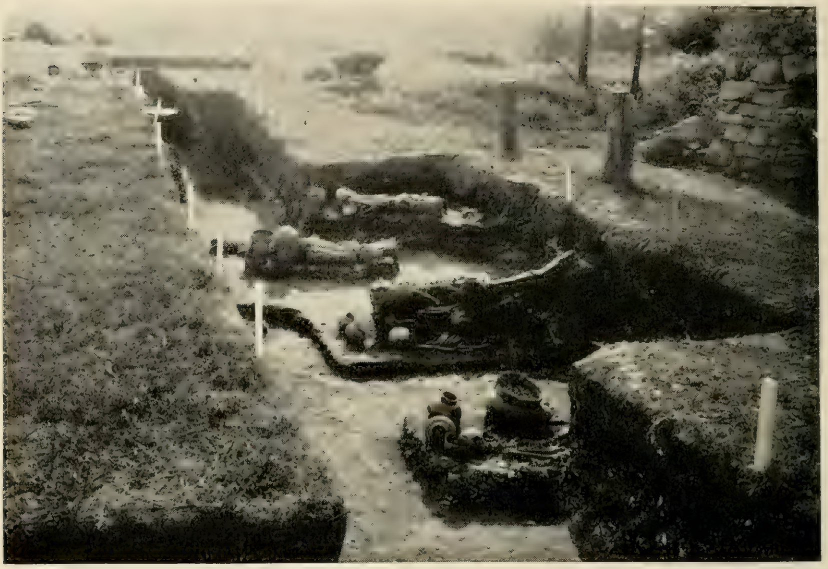


Looking East; Base of Blocks Nos. 2 and 3, and 115-Foot Trench Staked Out For Further Extension. Site Lu° 25, Unit 1.

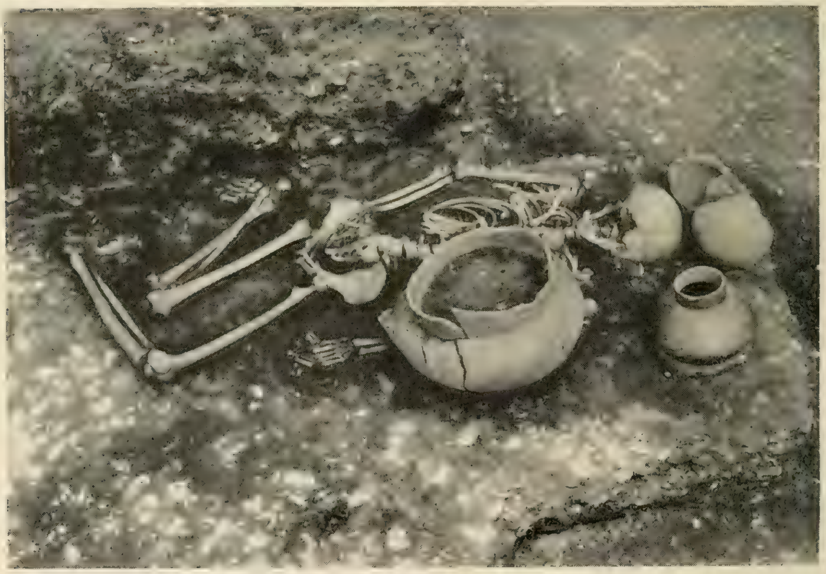


1. COMPLETION OF BLOCK NO. 6, SHOWING BURIALS BELOW ZONE B AND IN SUBSOIL. SITE LU° 25, UNIT 2.

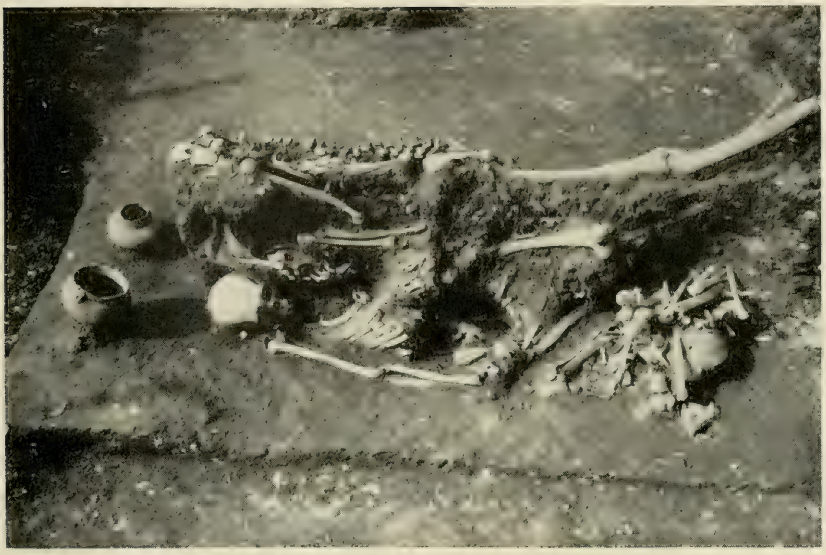
2. EXTENSION OF 115-FOOT TRENCH. BLOCK NO. 4 OUTLINED. SITE LU° 25, UNIT 2.



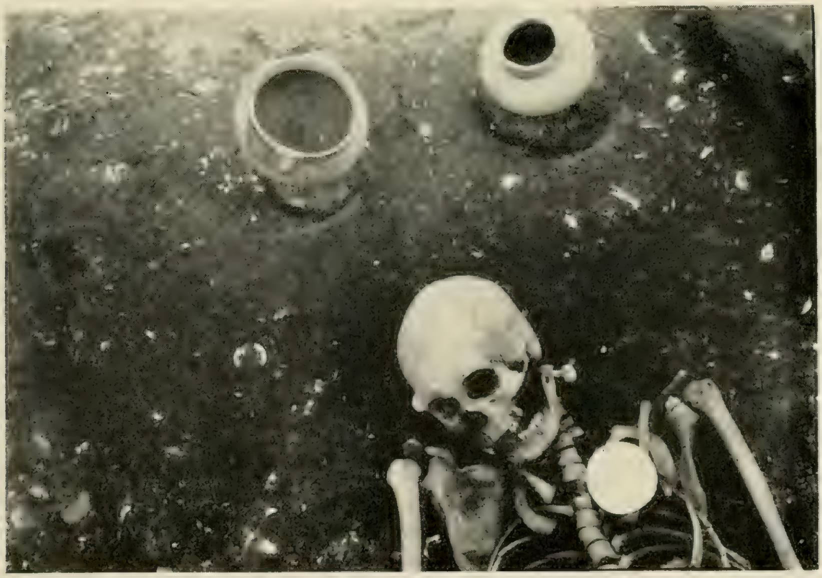
1. EXTENSION OF 115-FOOT TRENCH, SHOWING ONE SINGLE AND THREE MULTIPLE INTRUSIVE BURIALS. SITE LU° 25, UNIT 2.



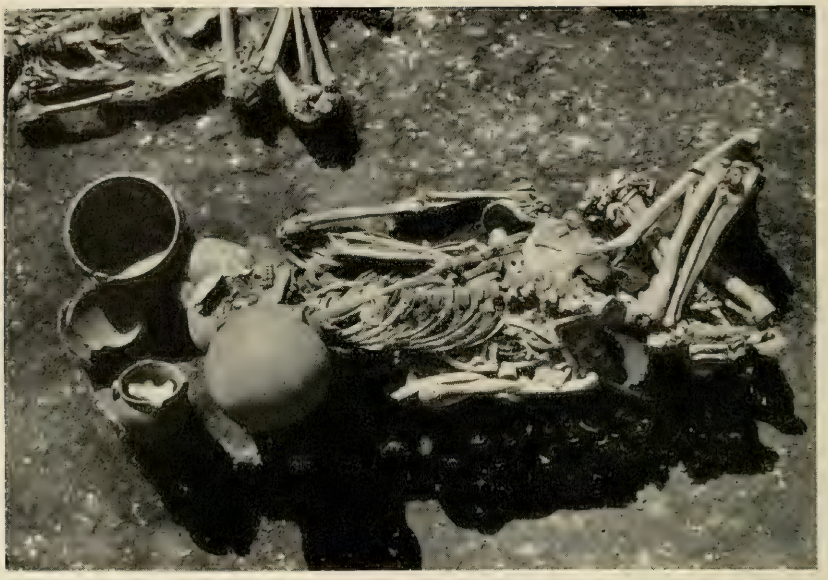
2. BURIAL NO. 158 WITH POTTERY VESSELS. NOTE FINE SPECIMEN OF "ENGRAVED" BLACK WARE. SITE LU° 25, UNIT 2.



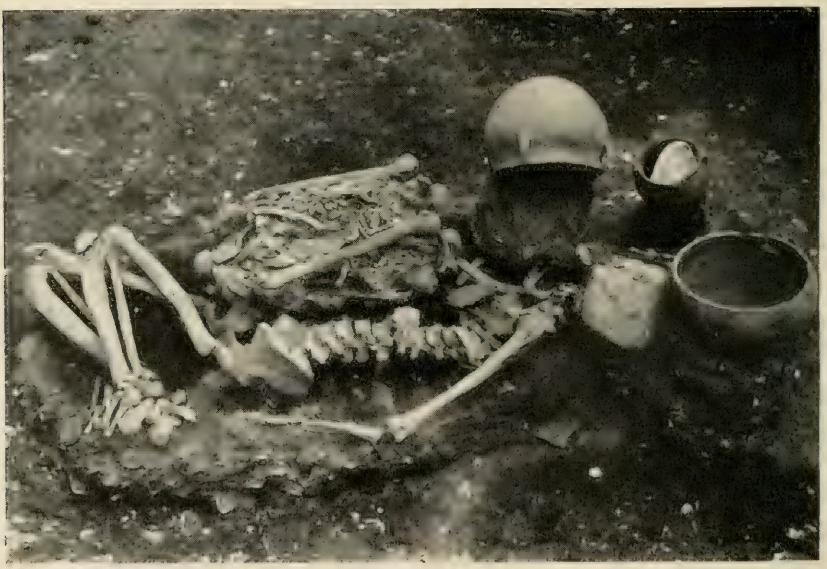
1. BURIALS NOS. 161, 162, AND 163. SITE Lu° 25, UNIT 2.



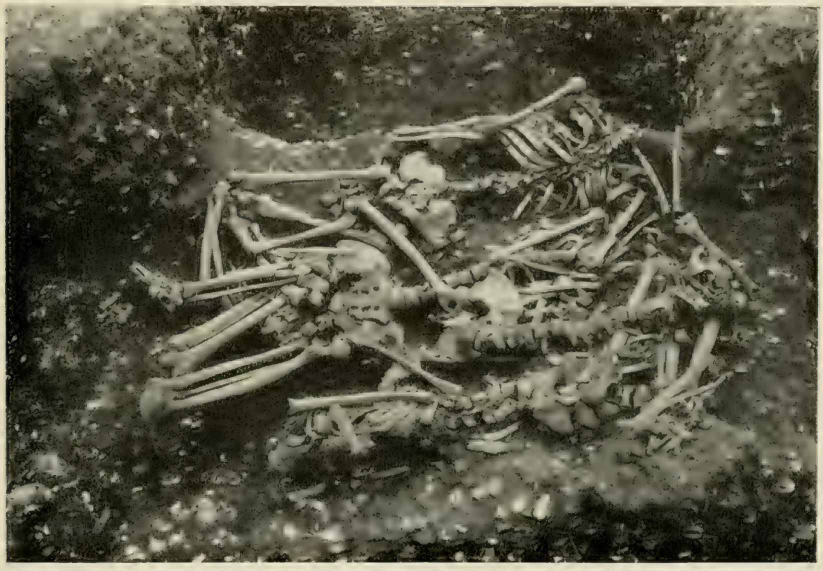
2. BURIAL NO. 163, SHOWING POTTERY AND SHELL GORGET. NOTE SHELL HAIRPINS IN SITU. SITE Lu° 25, UNIT 2.



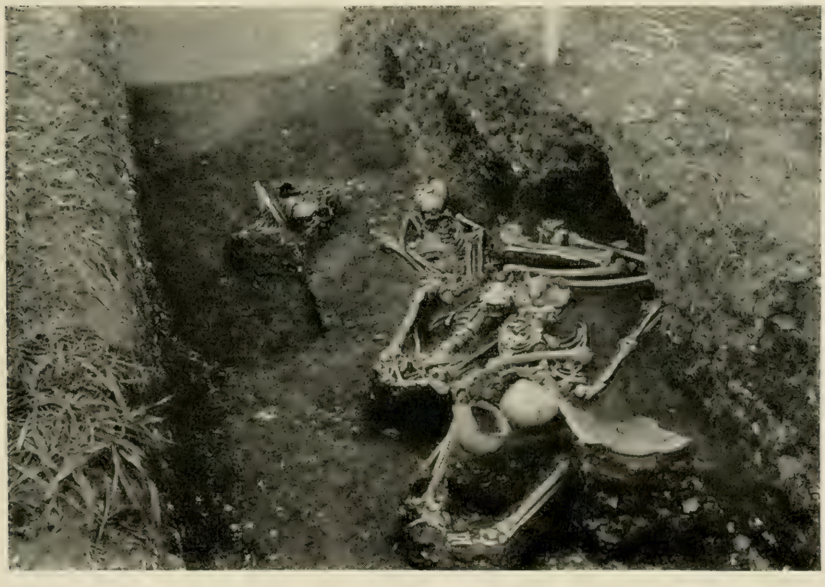
1. MULTIPLE BURIAL. SKELETONS NOS. 145, 146, AND 147. SITE Lu° 25, UNIT 2.



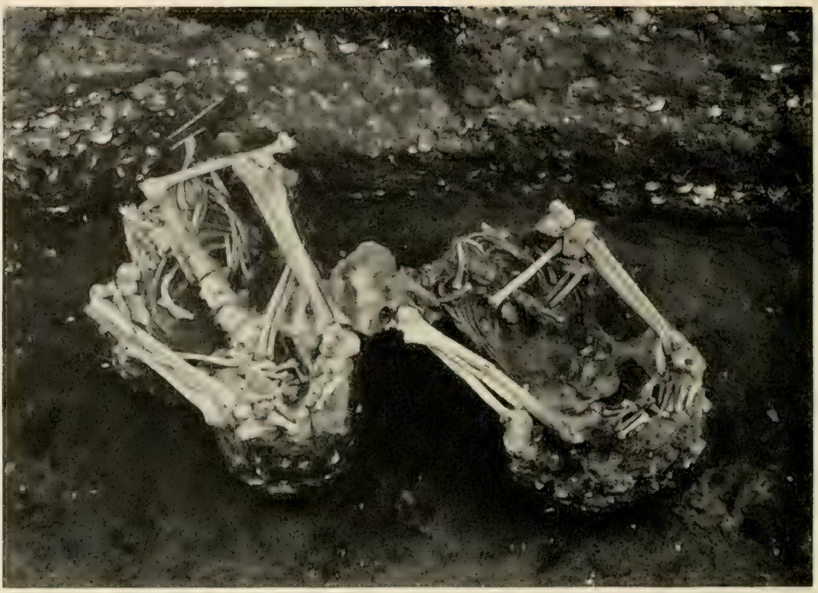
2. MULTIPLE BURIAL. SKELETON NO. 145 REMOVED, SHOWING NO. 147 A REBURIAL. SITE Lu° 25, UNIT 2.



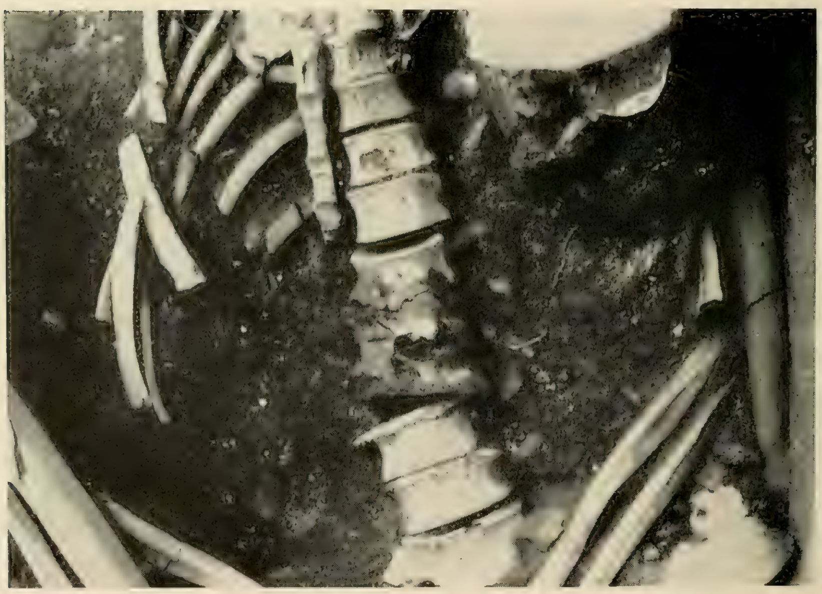
1. FOUR HEADLESS ADULT SKELETONS. BURIALS NOS. 164, 165, 166, 167, AND AN INFANT, NO. 224. SITE LU° 25, UNIT 2.



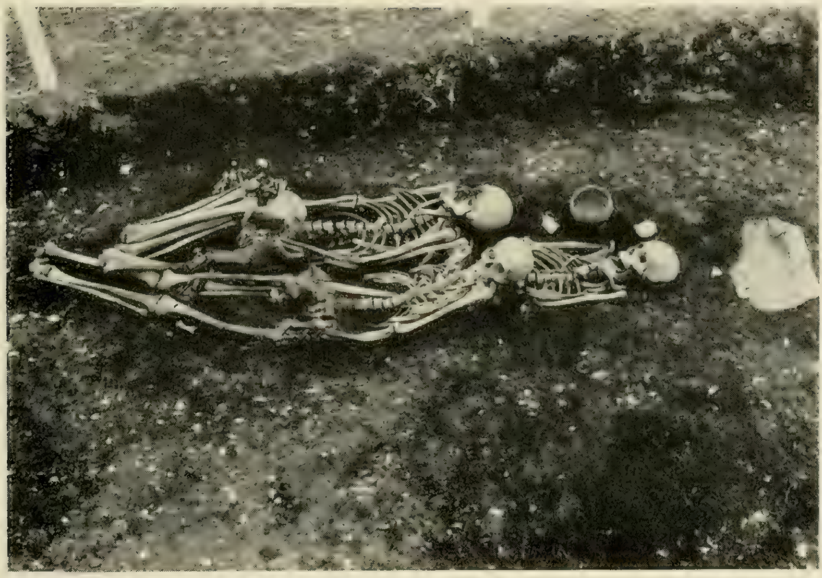
2. BURIALS NOS. 169, 170, AND 171, IN 115-FOOT TRENCH. SITE LU° 25, UNIT 2.



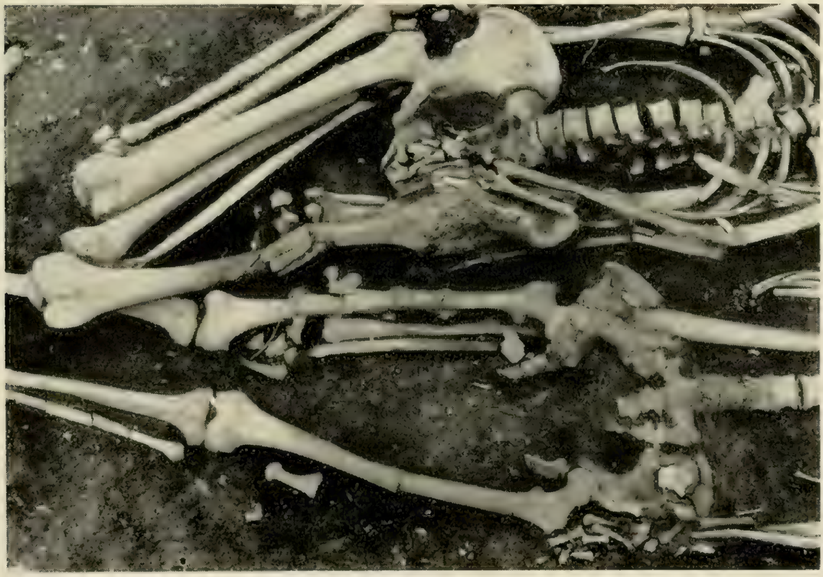
1. TWO HEADLESS BURIALS NOS. 170 AND 171. BURIAL NO. 169 REMOVED. SITE LU° 25, UNIT 2.



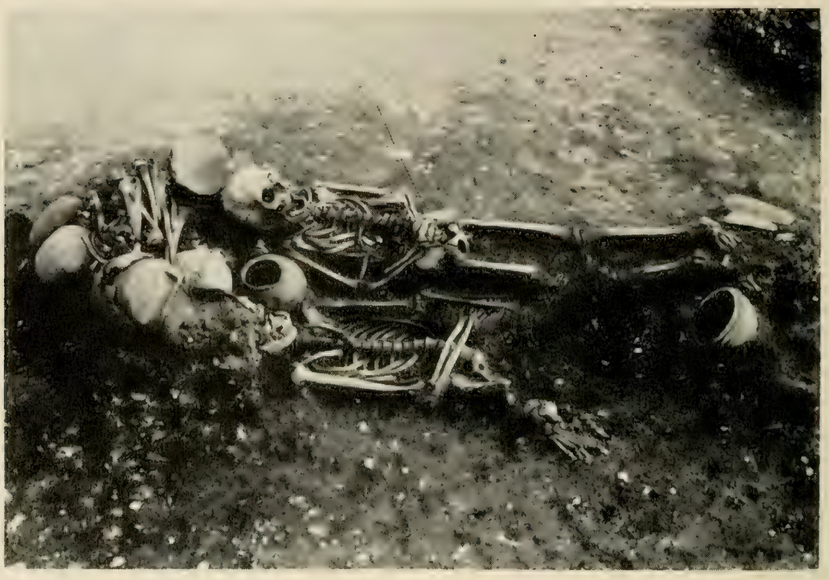
2. PATHOLOGICAL VERTEBRAE. BURIAL NO. 170. SITE LU° 25, UNIT 2.



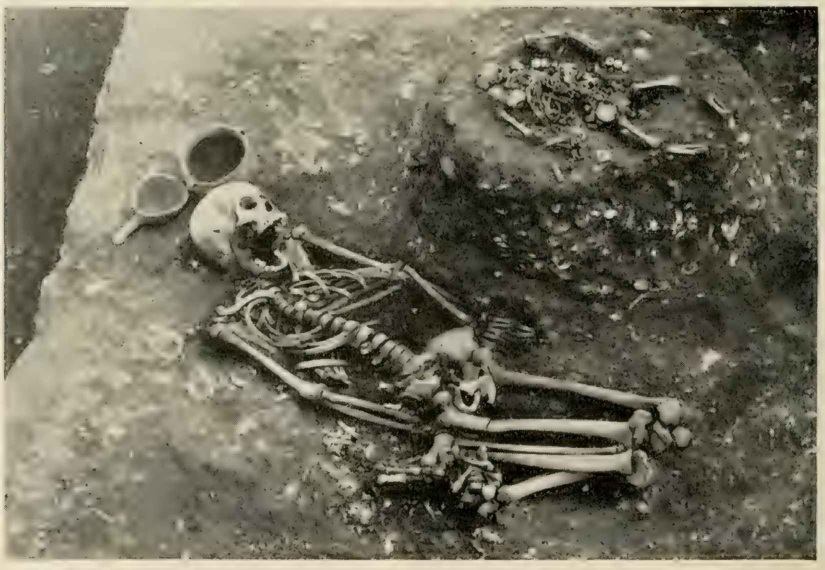
1. BURIALS NOS. 326, 327, AND 328. SITE LU° 25, UNIT 2.



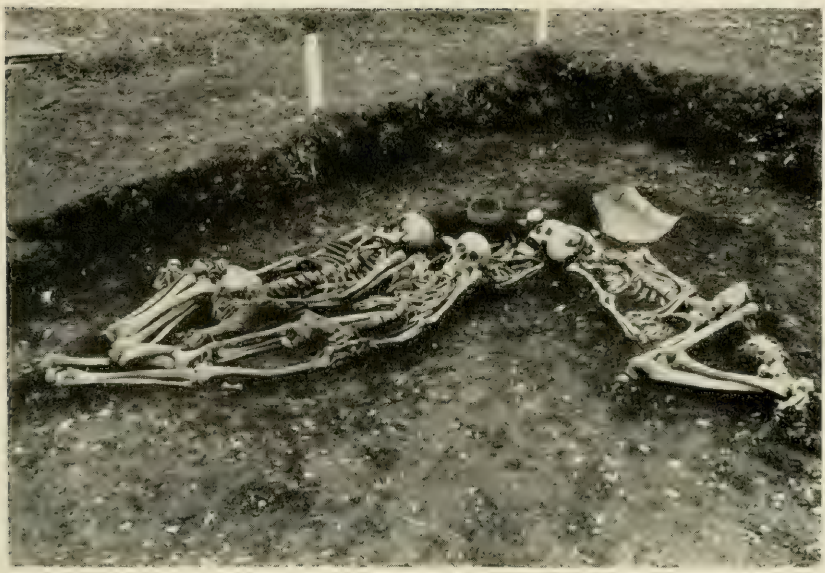
2. SHOWING EFFECT OF CREMATORY FIRE BUILT OVER PELVIS OF BURIALS NOS. 326 AND 327. SITE LU° 25, UNIT 2.



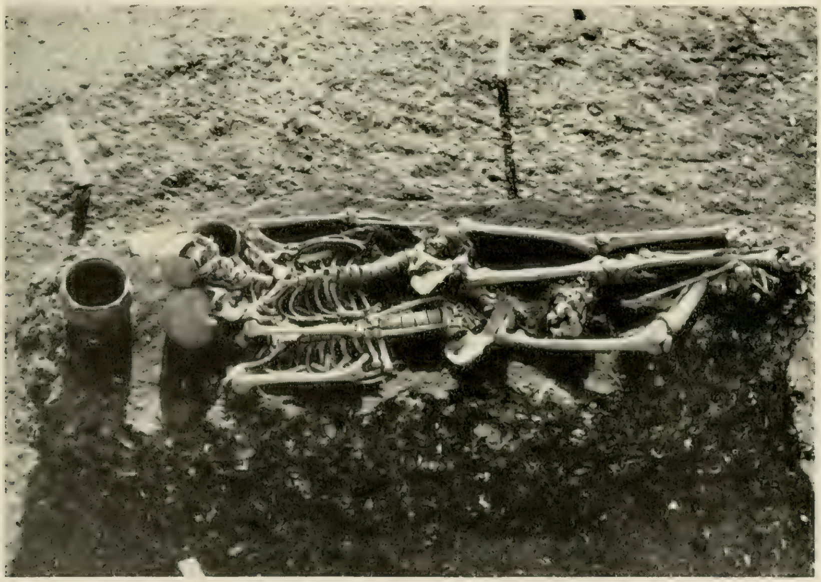
1. BURIALS NOS. 243 AND 244 EXTENDED. BURIAL NO. 247, A BUNDLE BURIAL AND THREE EXTRA SKULLS WITH 20 FIELD SPECIMENS. SITE LU° 25, UNIT 2.



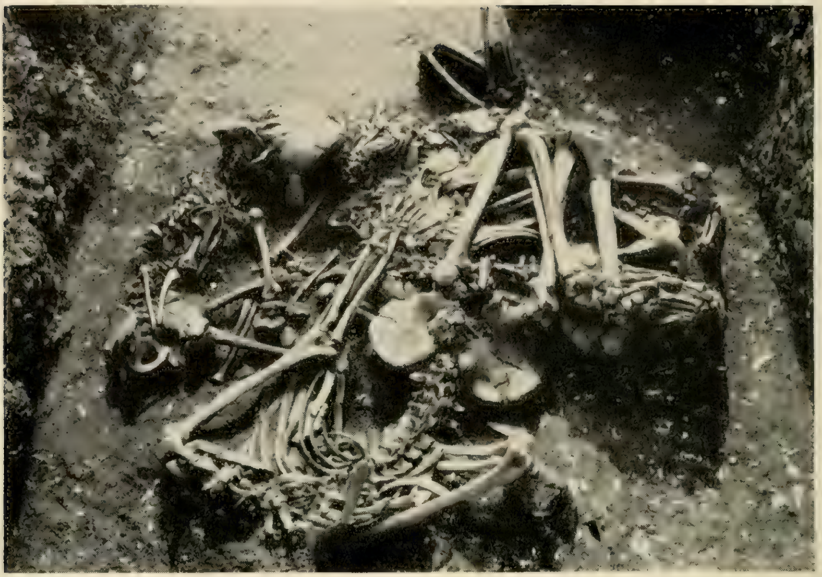
2. BURIAL NO. 284 WITH POT AND POTTERY LADLE. SITE LU° 25, UNIT 2.



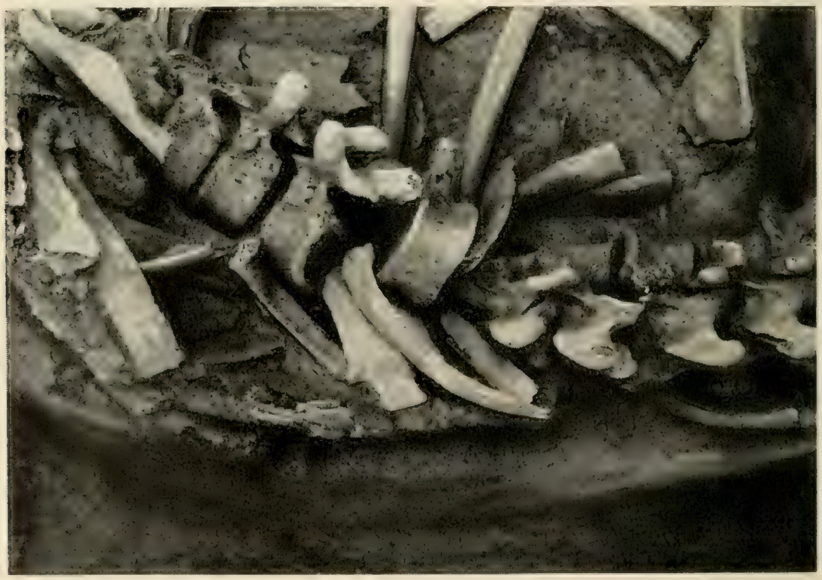
1. BURIALS NOS. 324, 325, 326, 327, AND 328. SITE LU° 25, UNIT 2.



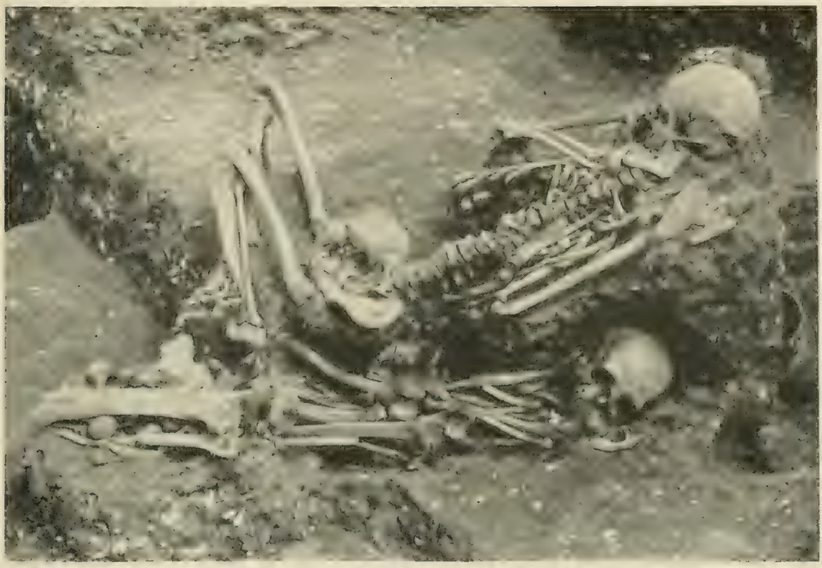
2. BURIALS NOS. 342 AND 343. SITE LU° 25, UNIT 2.



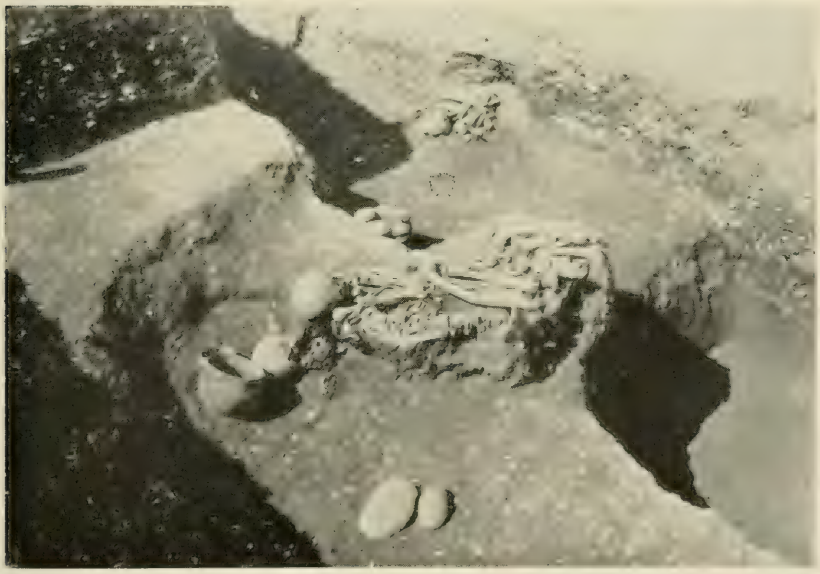
1. Burials Nos. 206, 207, 208, and 209. Each Burial Is a Different Type. All Skulls Disarticulated. One Missing. Site Lu° 25, Unit 2.



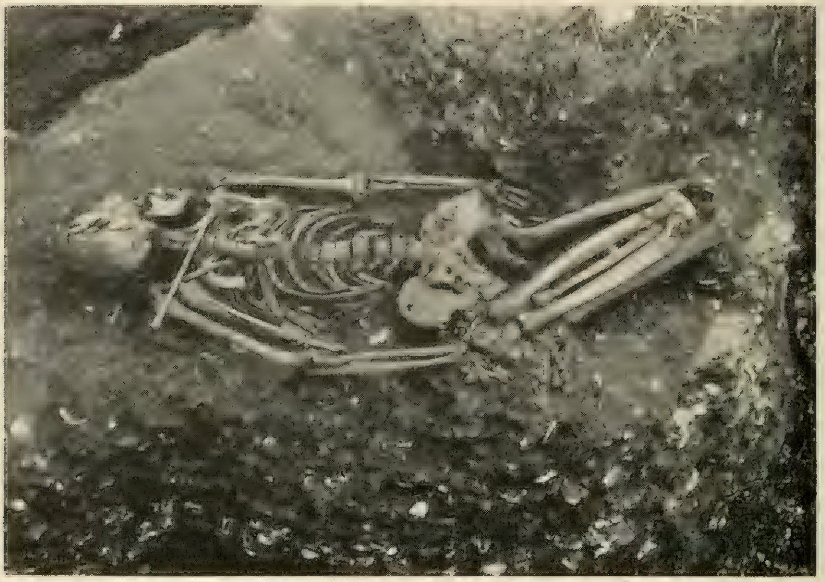
2. Burial No. 190 With Flint Point in the Twelfth Thoracic Vertebra. Site Lu° 25, Unit 2.



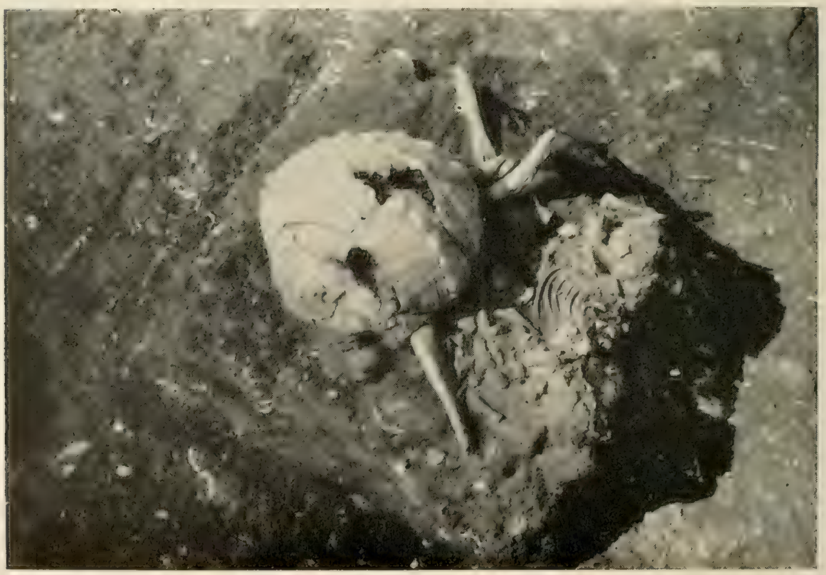
1. MULTIPLE BURIALS NOS. 178, 179, AND 180. SITE Lu° 25, UNIT 2.



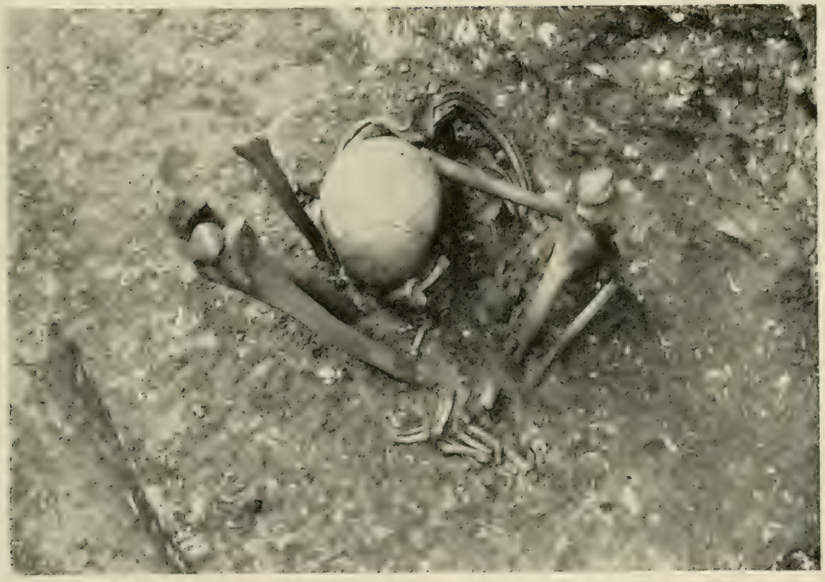
2. SEPARATE SKULL NO. 188 WITH ARTIFACTS UNDER BURIAL NO. 180. SITE Lu° 25, UNIT 2.



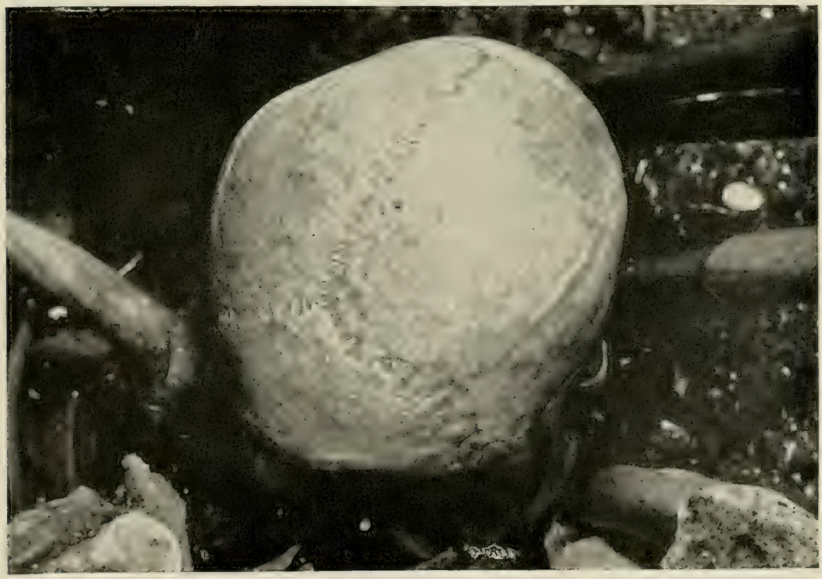
1. Burial No. 174, Showing Two Long-Bone Awls. Site Lu° 25, Unit 2.



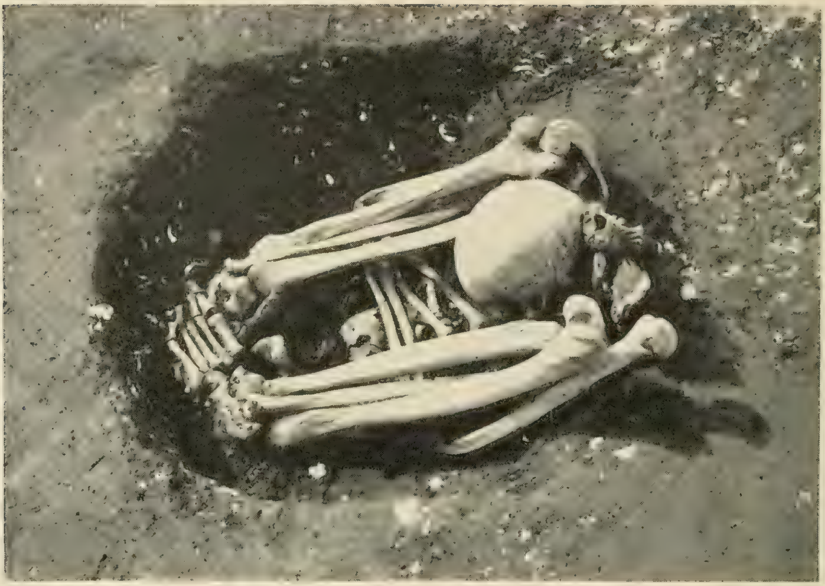
2. Burial No. 279. A Partially Cremated Infant Covered With Conch Shell and Conch Columellae. Site Lu° 25, Unit 2.



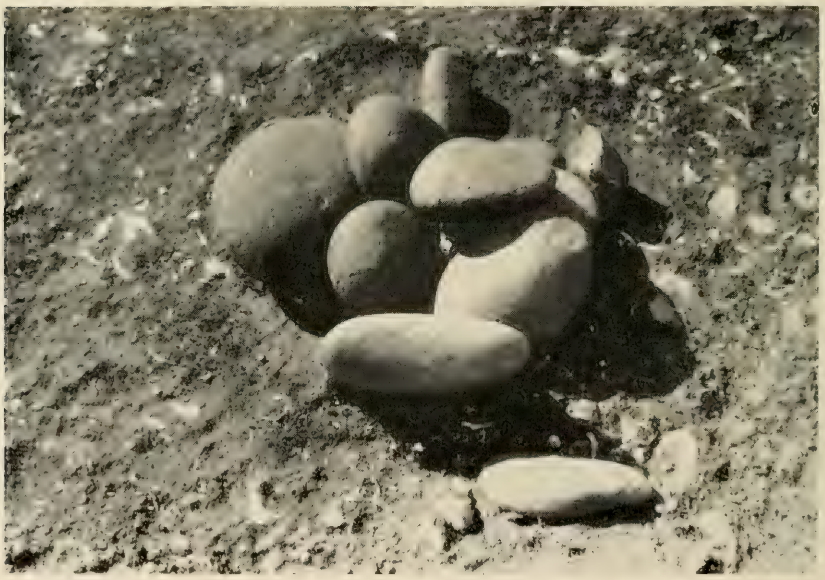
1. Burial No. 296. Sitting Type 5A. Site Lu° 25, Unit 2.



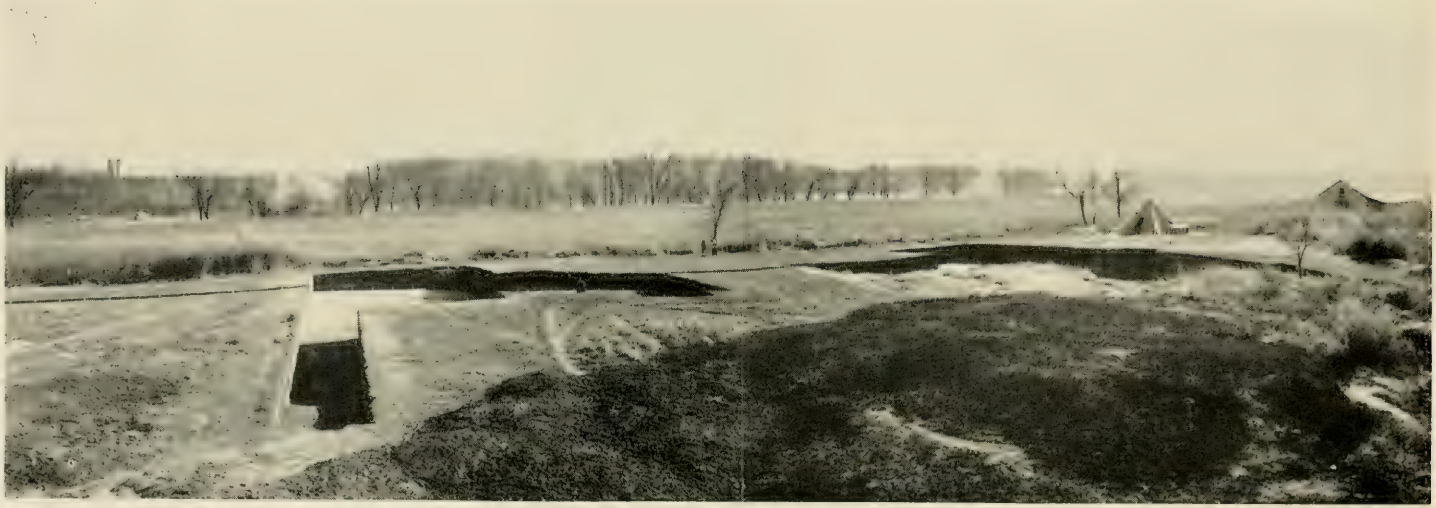
2. Close-up of Skull No. 296. Note Pathological Ridges on Each Side. Site Lu° 25, Unit 2.



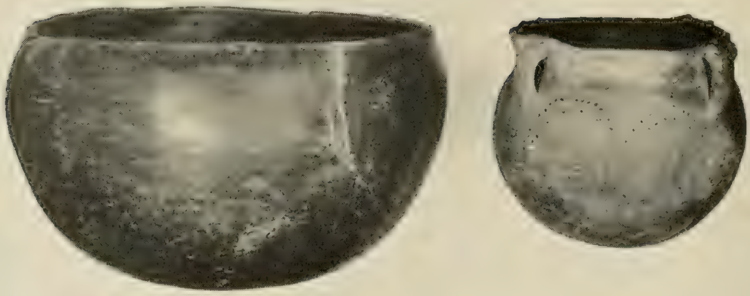
1. BURIAL NO. 312. PIT BURIAL TYPE 1B AT BASE OF MIDDEN. NOTE STONE AND SHELL BEADS. SITE LU° 25, UNIT 2.



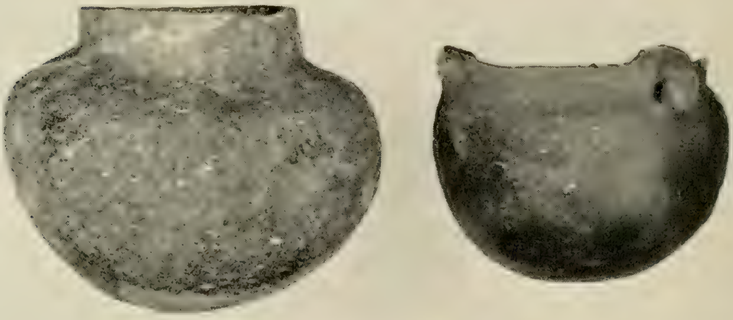
2. FEATURE NO. 60. CACHE OF WATER-WORN PEBBLES USED AS HAMMERSTONES. SITE LU° 25, UNIT 2.



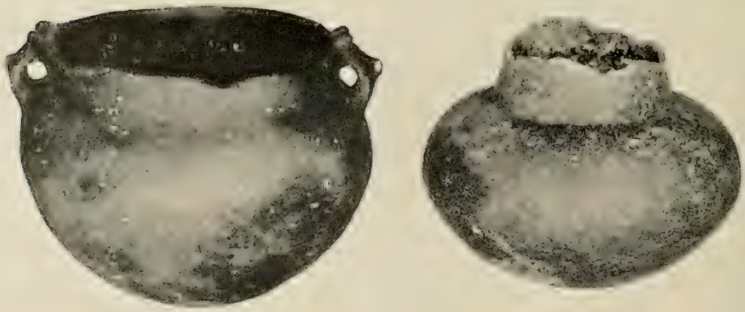
PANORAMA VIEW OF EXCAVATIONS LOOKING SOUTH. SITE LU° 25, UNIT 2.



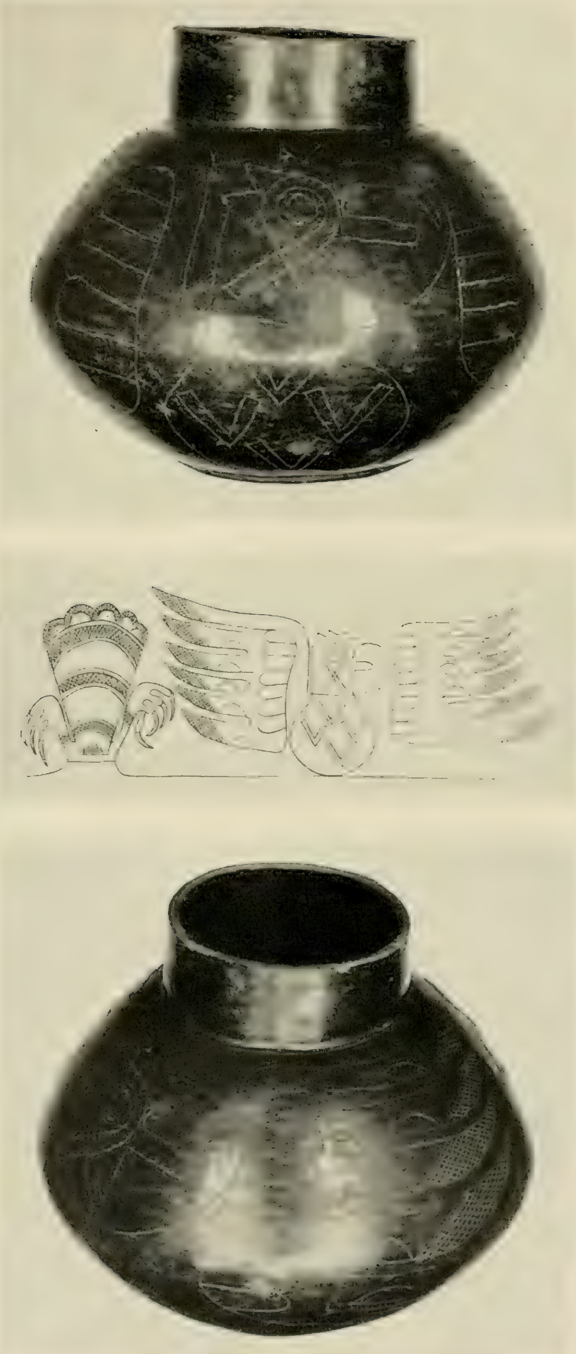
1. ASSOCIATIONS WITH BURIAL NO. 146. SITE LU° 25, UNIT 2.



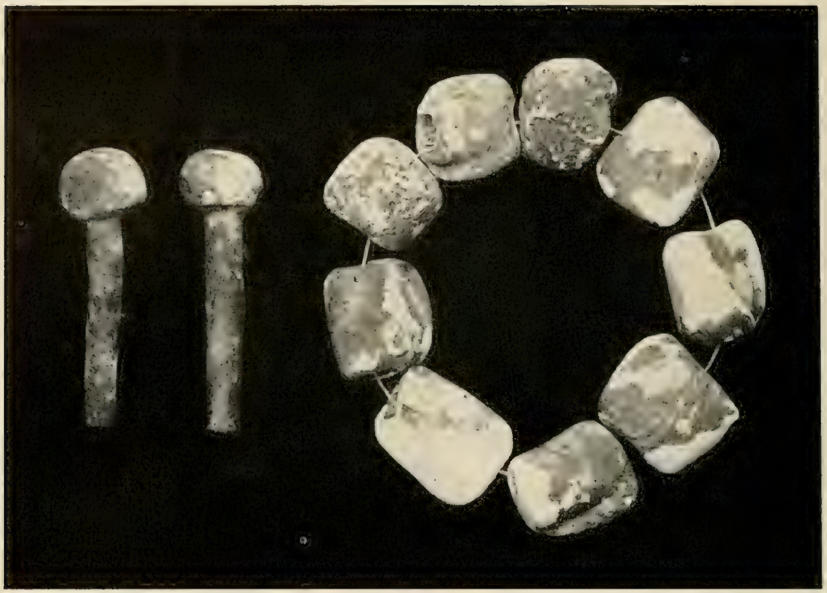
2. ASSOCIATIONS WITH BURIAL NO. 158. SITE LU° 25, UNIT 2.



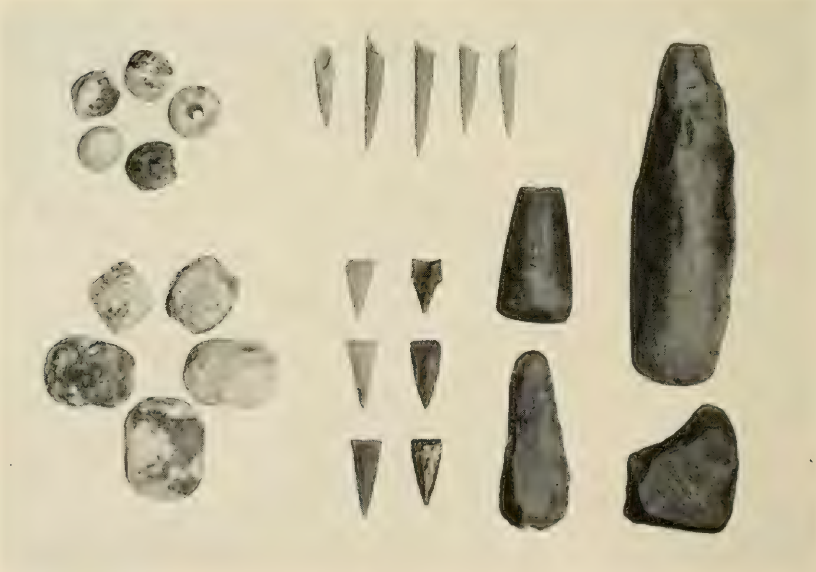
3. ASSOCIATIONS WITH BURIAL NO. 163. SITE LU° 25, UNIT 2.



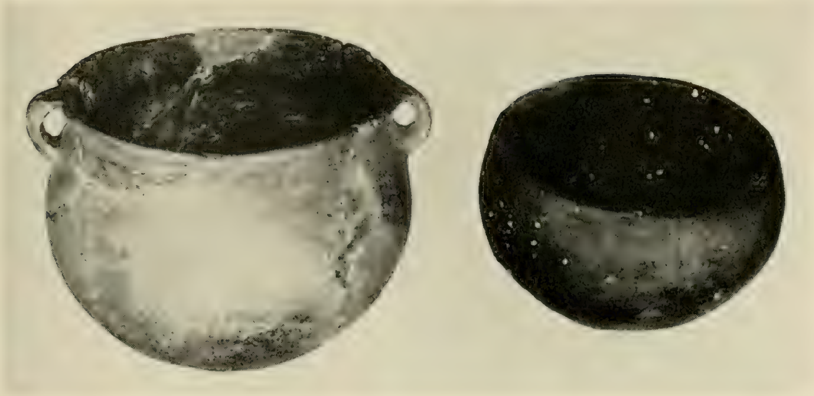
BLACK-SURFACED WATER BOTTLE WITH ENGRAVED DESIGN OF EAGLE FROM BURIAL NO. 158. SITE LU° 25, UNIT 2.



1. SHELL ARTIFACTS FROM BURIAL NO. 161. SITE Lu° 25, UNIT 2.

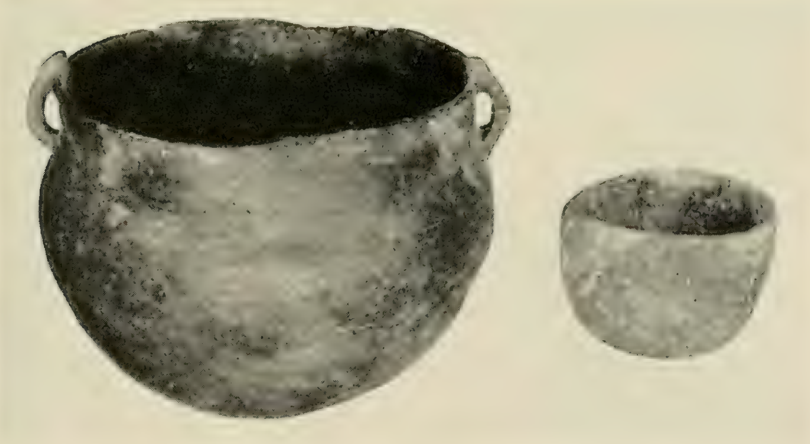


2. ARTIFACTS FROM BURIAL NO. 178. SITE Lu° 25, UNIT 2.

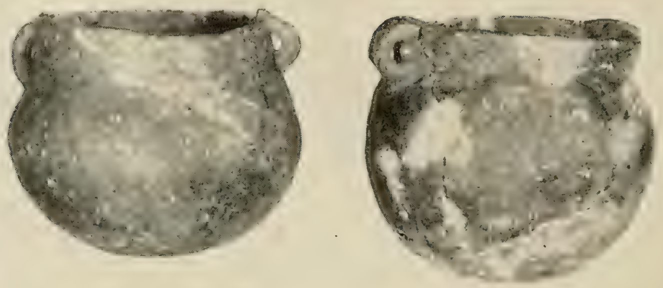


1. POT FROM BURIAL NO. 169 AND BOWL FROM BURIAL NO. 250. SITE Lu° 25. UNIT 2.

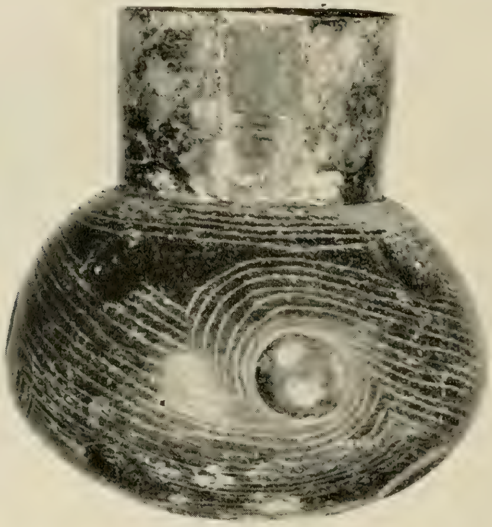
2. LONG-BONE AWLS WITH BURIAL NO. 174. SITE Lu° 25. UNIT 2.



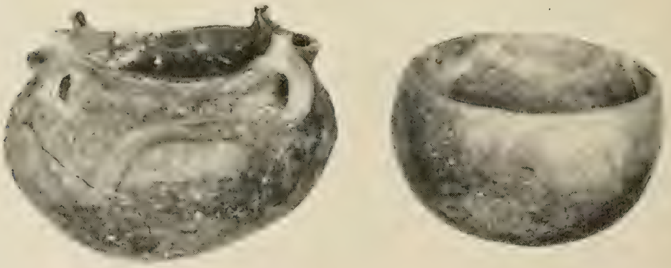
3. POTTERY VESSELS WITH BURIAL NO. 188. SITE Lu° 25. UNIT 2.



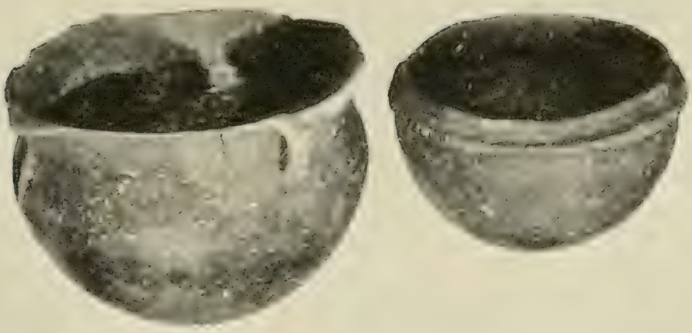
1. POTTERY VESSELS WITH BURIAL NO. 228. SITE LU° 25, UNIT 2.



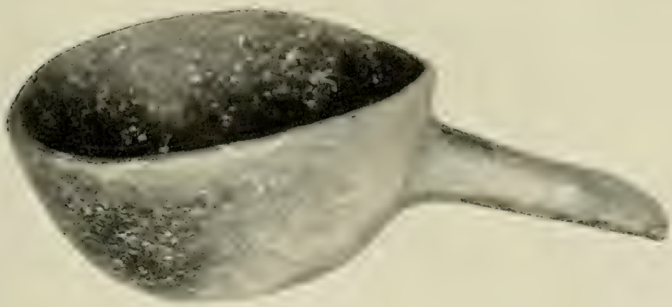
2. WATER BOTTLE, BLACK SURFACE, ENGRAVED. SITE LU° 25, UNIT 2.



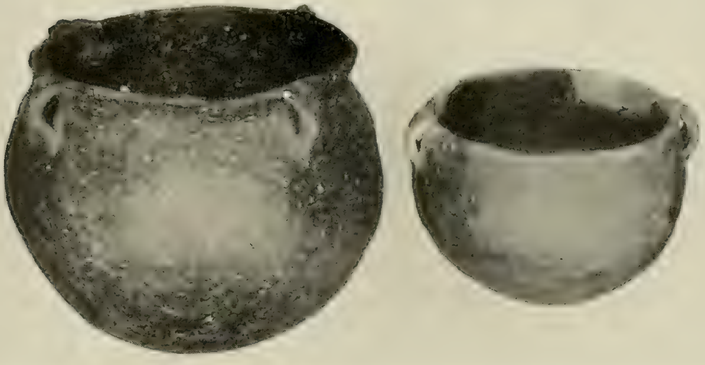
3. VESSELS FROM BURIALS NOS. 250 AND 240. SITE LU° 25, UNIT 2.



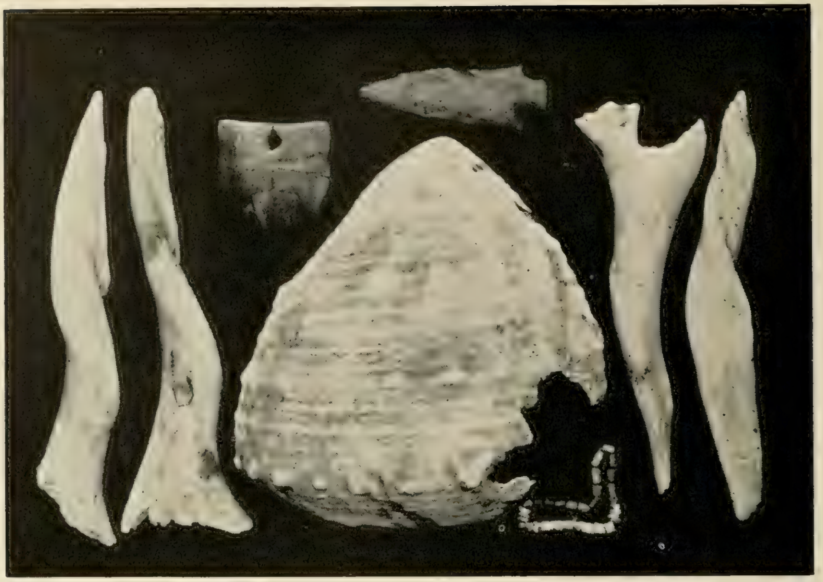
1. VESSELS FROM BURIALS NOS. 243 TO 248. SITE Lu° 25, UNIT 2.



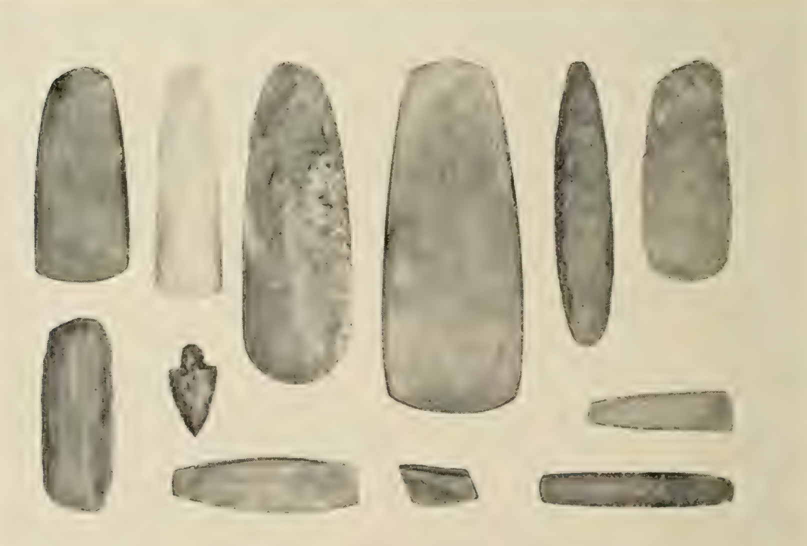
2. POTTERY LADLE WITH BURIAL NO. 284. SITE Lu° 25, UNIT 2.



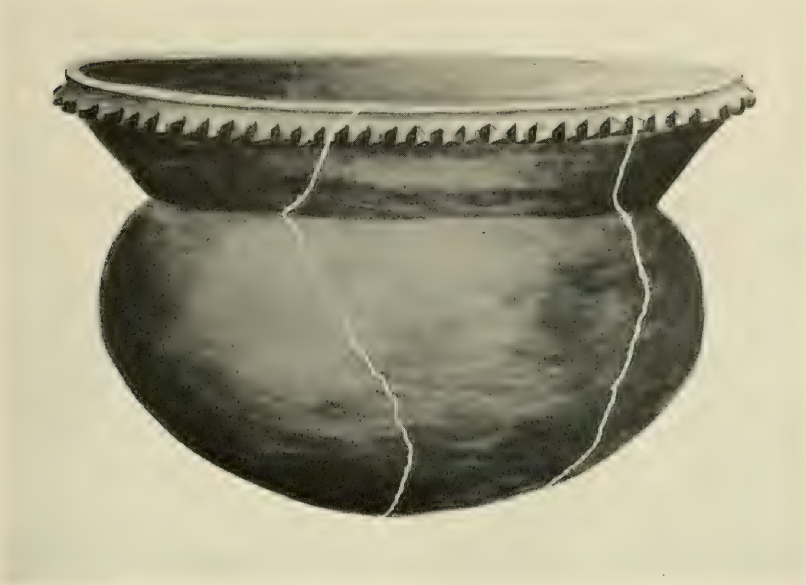
3. TWO VESSELS FROM BURIALS NOS. 342 AND 343. SITE Lu° 25, UNIT 2.



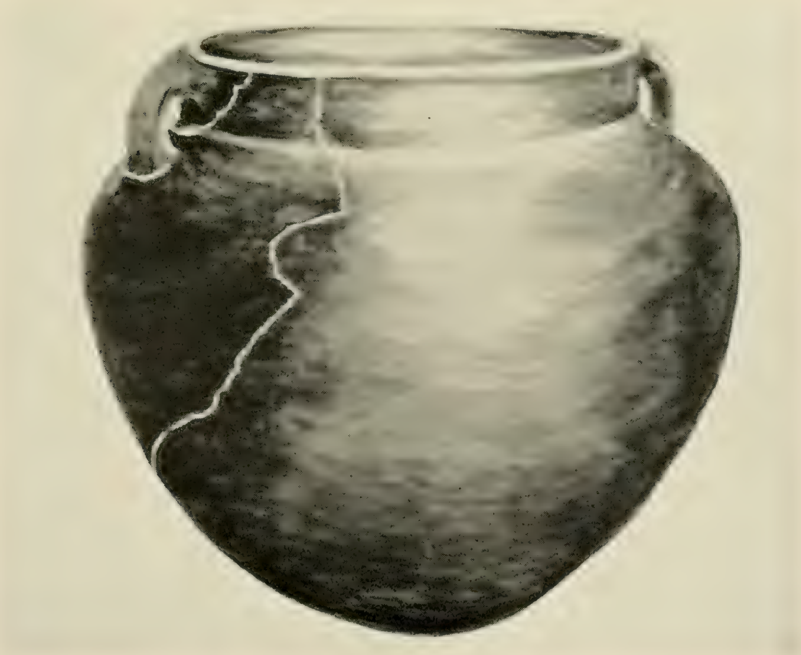
1. Large Conch, Columella, and Artifacts From Burial No. 279. Site Luº 25, Unit 2.



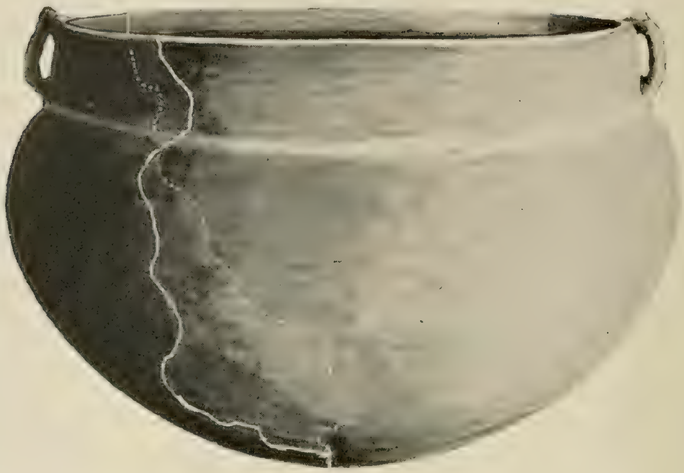
2. Artifacts From Multiple Burials Nos. 243 to 248. Site Luº 25, Unit 2.



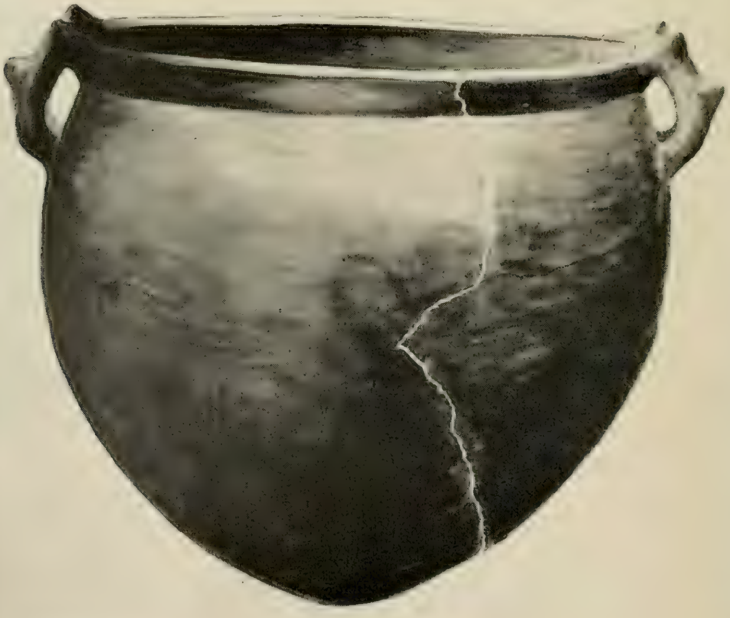
1. Drawing Restoration From Sherds. Site Lu° 25, Unit 2.



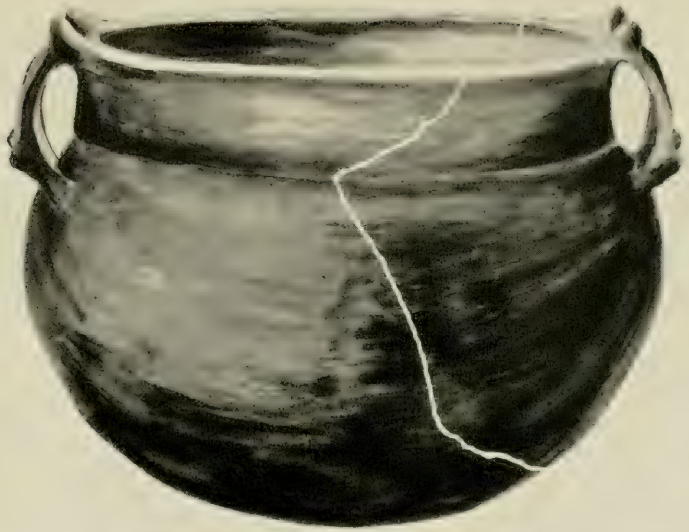
2. Drawing Restoration From Sherd. Site Lu° 25, Unit 2.



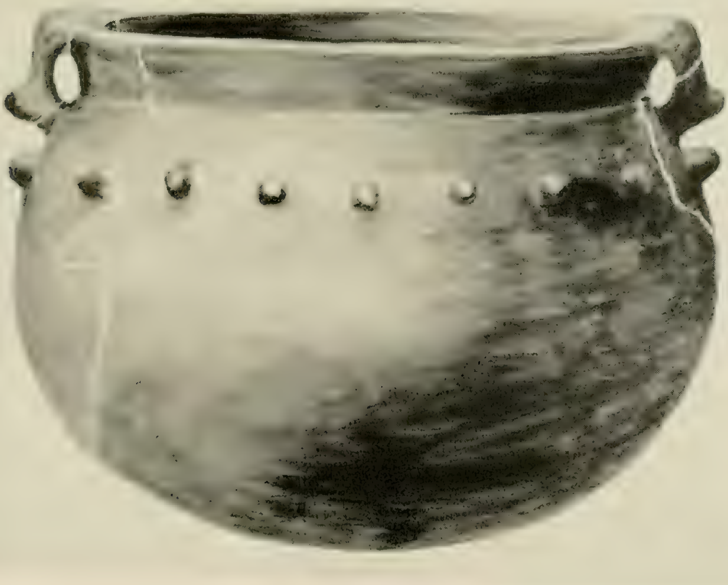
1. RESTORATION FROM SHERDS WITH BURIALS NOS. 226 AND 227. SITE LU° 25, UNIT 2.



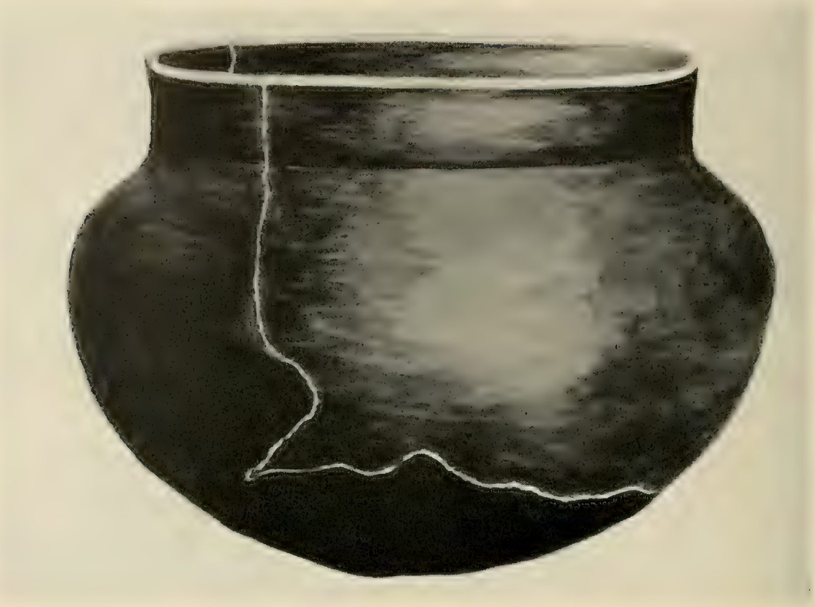
2. DRAWING RESTORATION FROM SHERD. SITE LU° 25, UNIT 2.



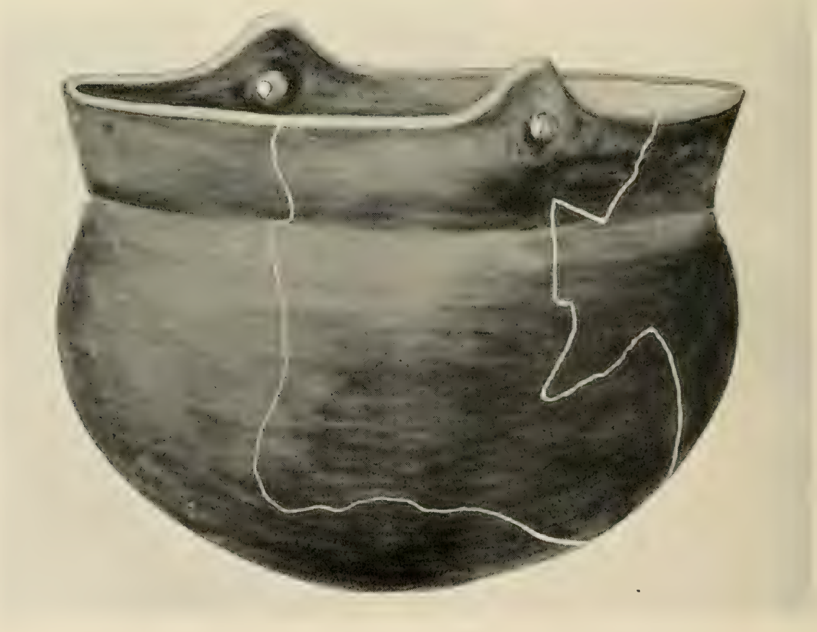
1. DRAWING RESTORATION FROM SHERD. SITE LU° 25, UNIT 2.



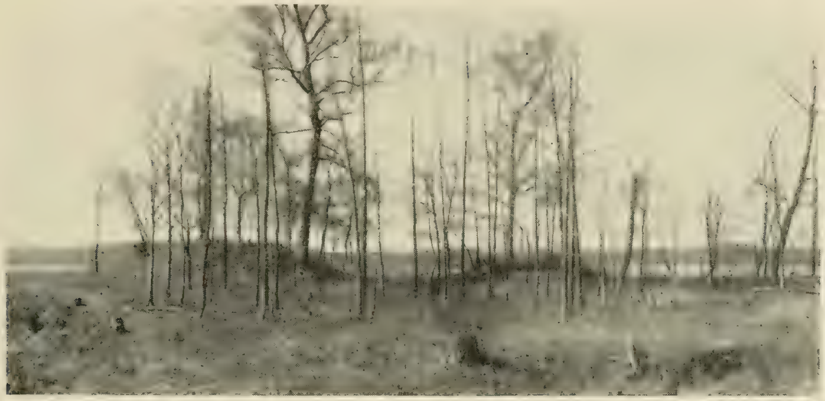
2. DRAWING RESTORATION FROM SHERDS. SITE LU° 25, UNIT 2.



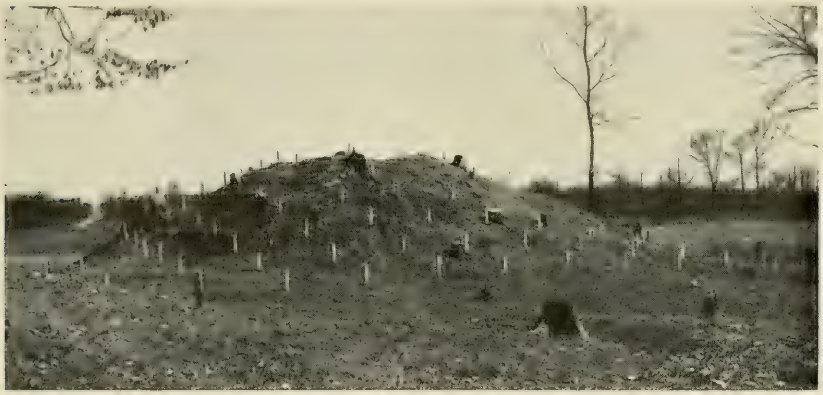
1. Restoration From Sherd With Burial No. 152. Site Lu° 25, Unit 2.



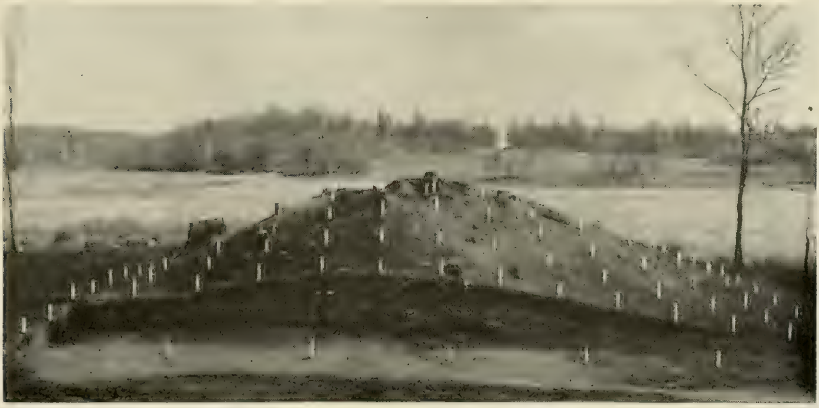
2. Drawing Restoration From Sherds. Site Lu° 25, Unit 2.



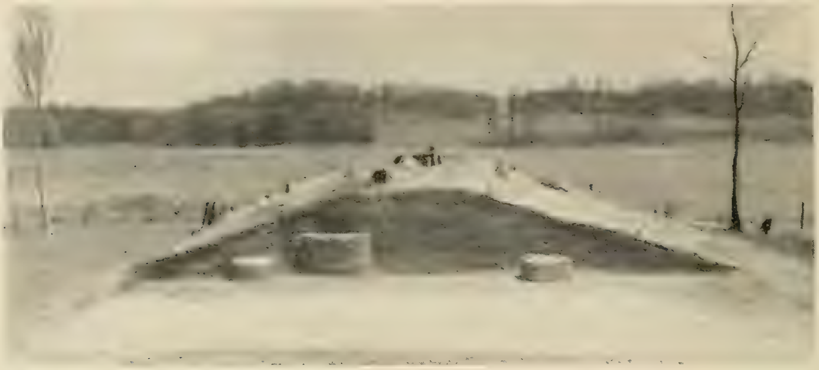
1. Two Mounds Viewed From the North, Looking Toward the River. Site Lu° 54.



2. Site Lu° 54 After Staking.

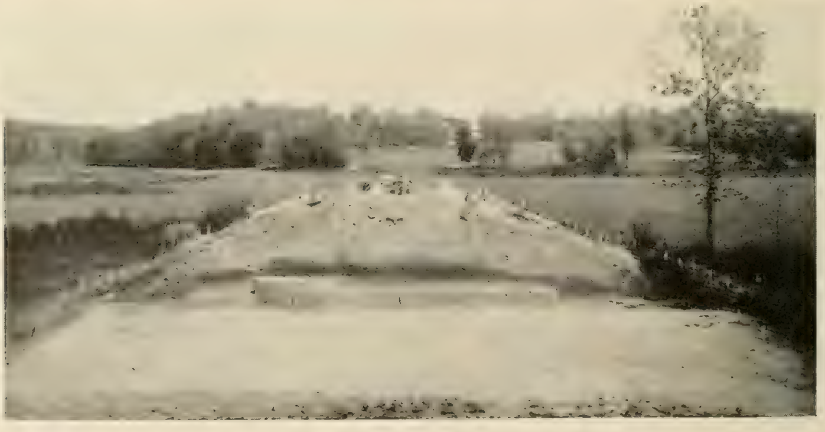


3. Completed 10-Foot Profile Viewed From the West. Site Lu° 54.

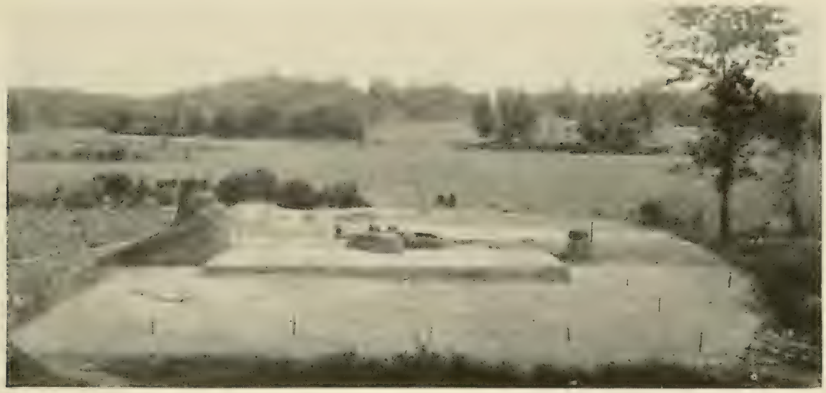


1. COMPLETED 20-FOOT PROFILE, SHOWING ROCKY NATURE OF MOUND EARTH. SITE Lu° 54.

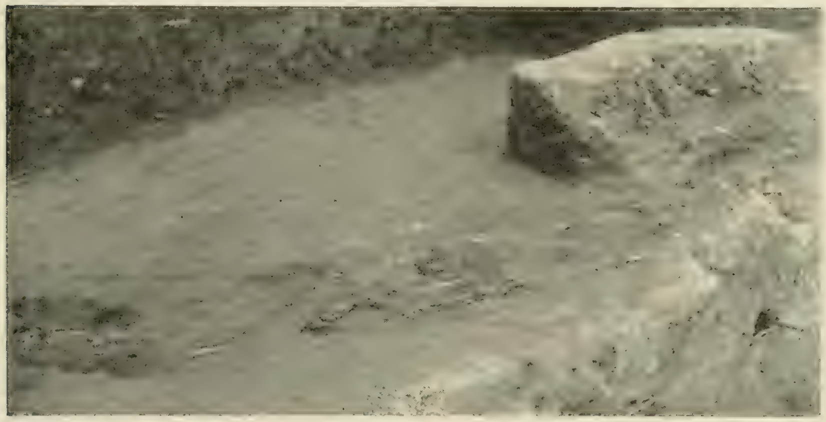
2. EXCAVATION IN PROGRESS. SITE Lu° 54.



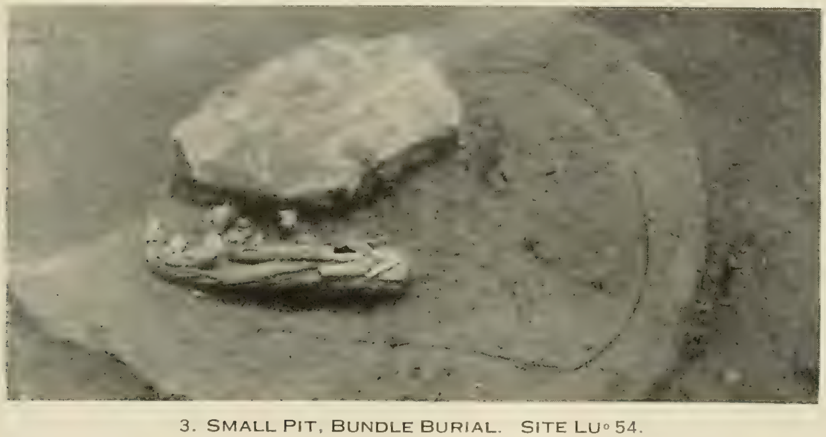
3. THE 25-FOOT PROFILE FROM THE WEST. SITE Lu° 54.



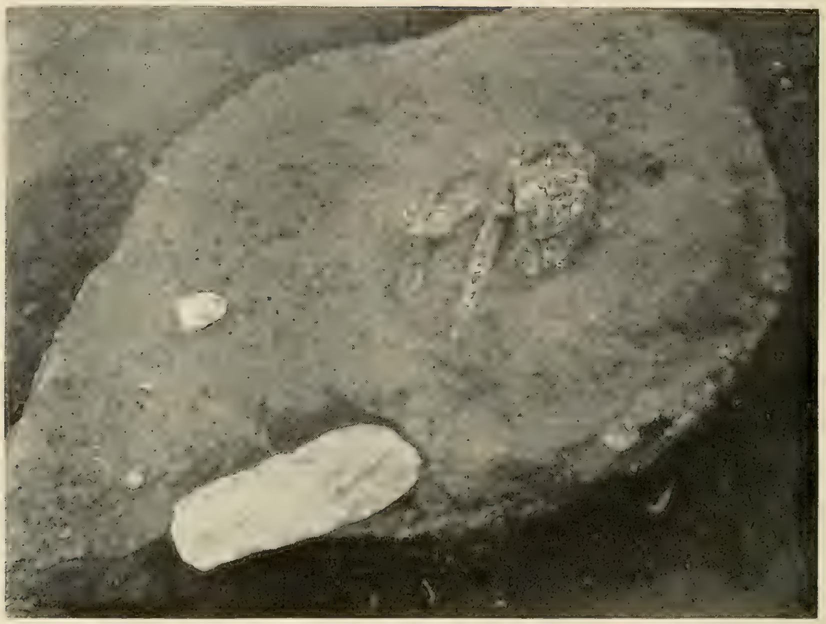
1. GENERAL VIEW OF MOUND BASE, SHOWING PITS. SITE Lu° 54.



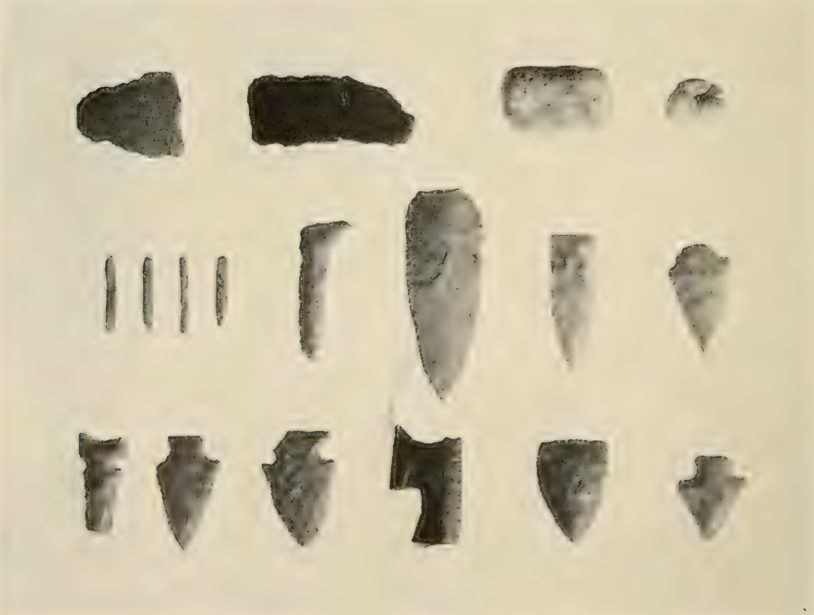
2. FRAGMENTARY SKELETON COVERED WITH LAYER OF CHARCOAL OVER PIT. SITE Lu° 54.



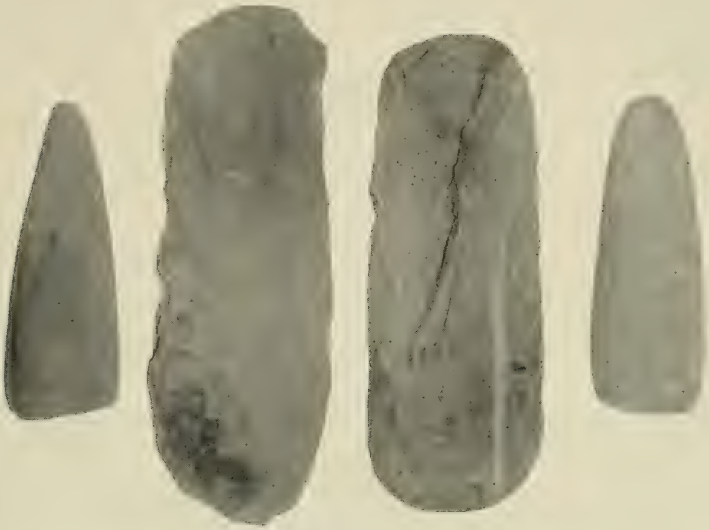
3. SMALL PIT, BUNDLE BURIAL. SITE Lu° 54.



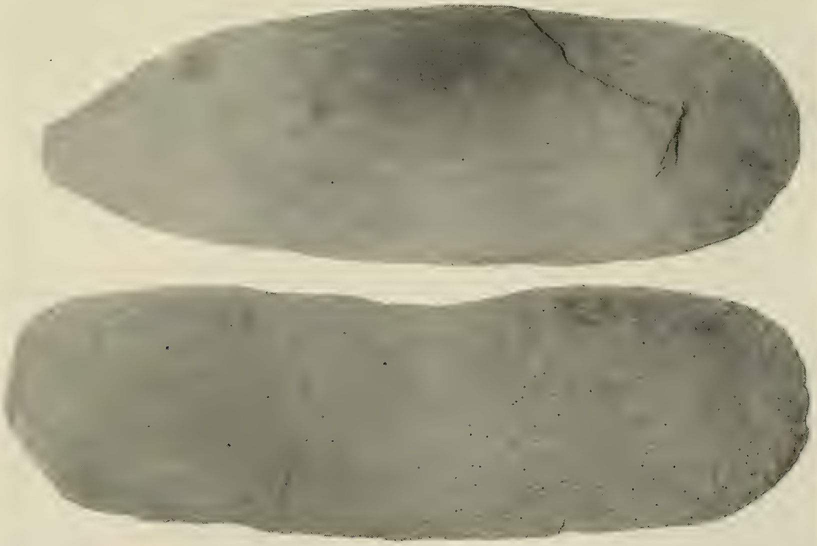
1. BURIAL NO. 5, GALENA AND GREENSTONE SPADE. SITE Lu° 54.



2. ARTIFACTS OF FLINT, GALENA, COPPER, AND POTTERY. SITE Lu° 54.



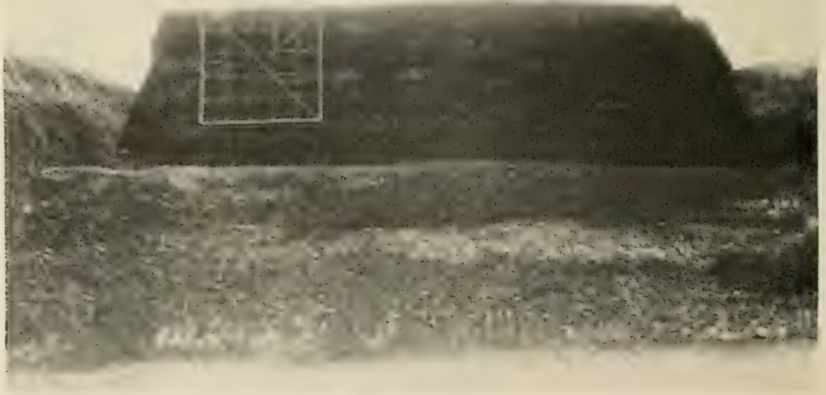
1. GREENSTONE CELTS. SITE Lu° 54.



2. GREENSTONE SPADES. SITE Lu° 54.

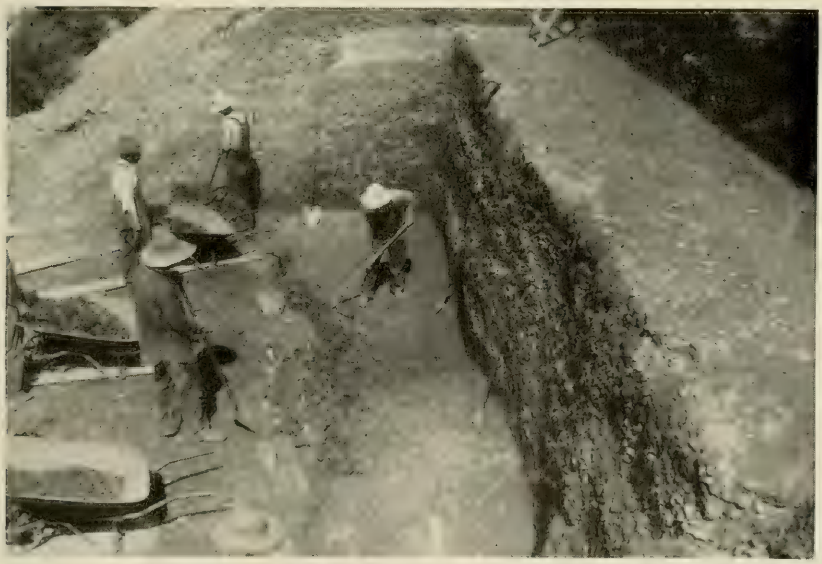
1. THE MOUND VIEWED FROM THE LANDWARD SIDE. SITE LU° 59.

2. TRENCHES ON SOUTH SIDE. DEEP TRENCHES WITH SLOPING WALLS TO PREVENT LANDSLIDES. SITE LU° 59.

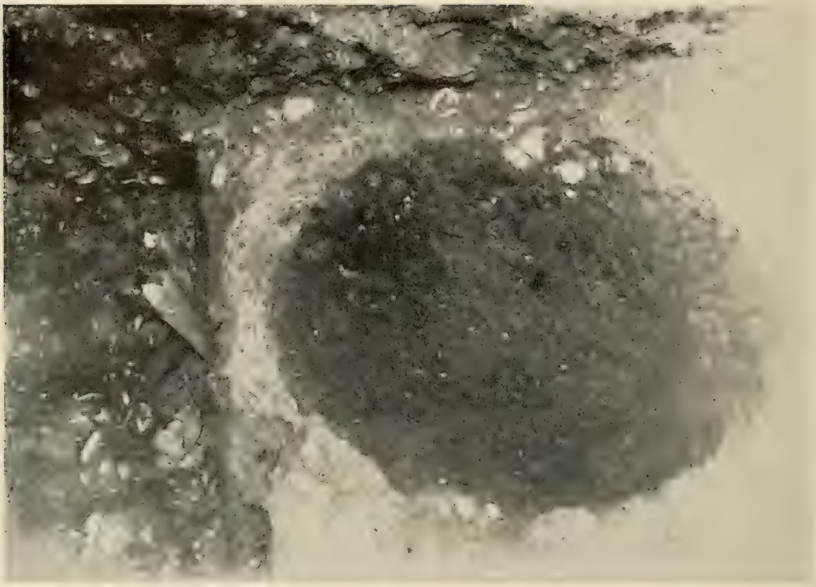


3. THE 60-FOOT CUT. METHOD OF PLOTTING PROFILES. SITE LU° 59.

1. TENNESSEE RIVER AS VIEWED FROM THE MOUND. LOOKING SOUTHEAST. SHOALS IN THE DISTANCE. SITE Lu° 59.

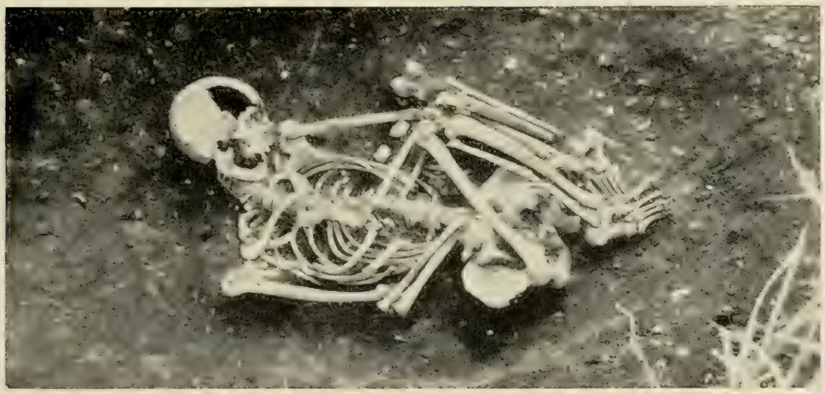


2. CUTTING THE 170-FOOT PROFILE. FIRST ON NORTH SIDE. PROFILE STEPPED BACK TO AVOID CAVE-IN. SITE Lu° 59.

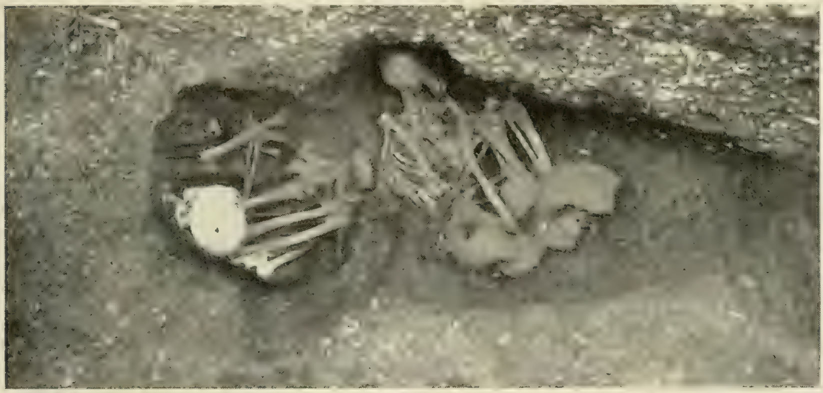


1. A Fire Basin, Feature No. 11. Site Lu° 59.

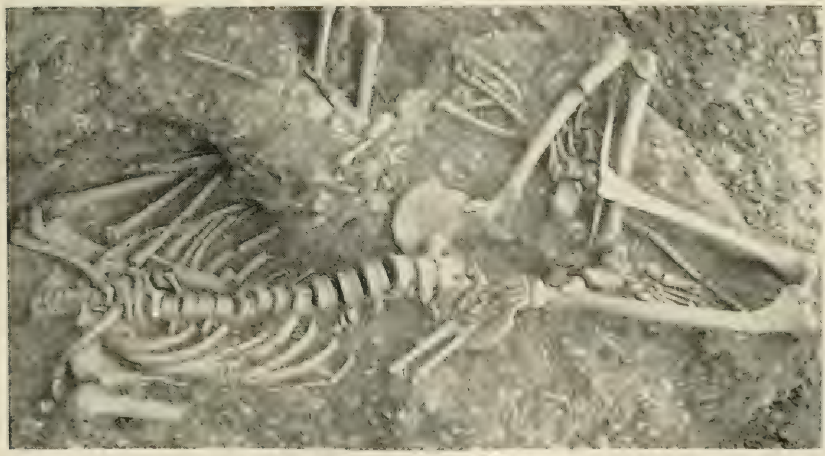
2. A Hearth Cremation, Feature No. 13 in the Profile, Longitudinal Section. Site Lu° 59.



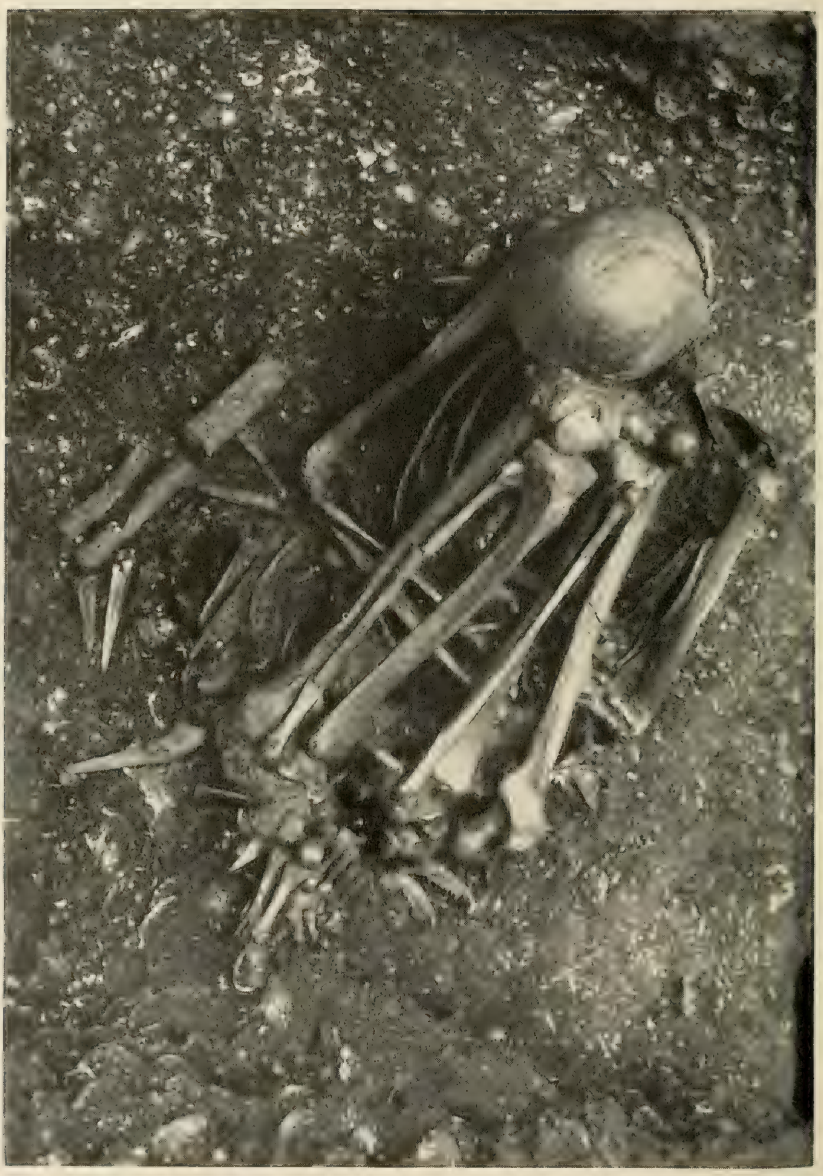
1. BURIAL NO. 4, TYPE 1B. SITE LU° 59.



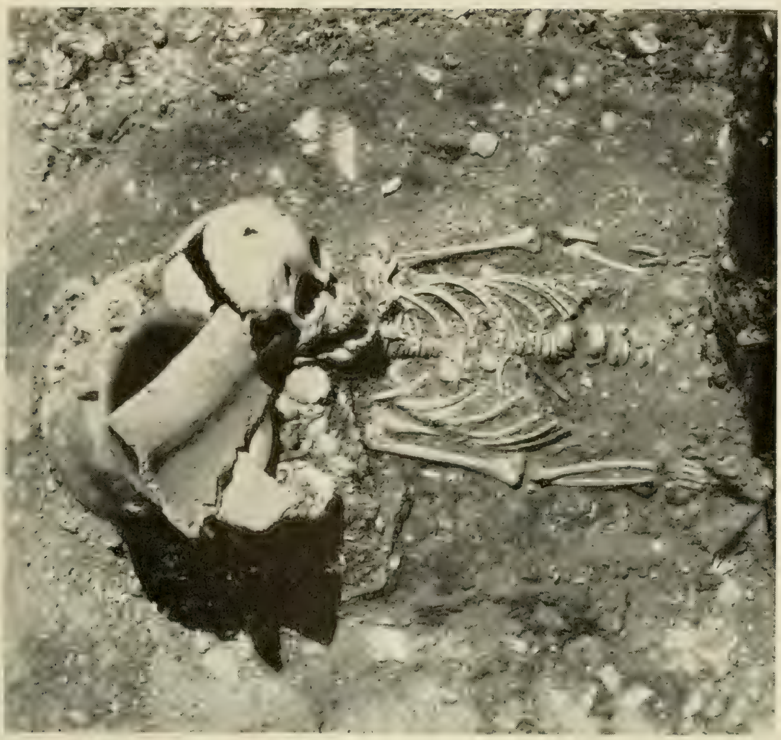
2. BURIALS NOS. 43, 49, AND 50. NOTE FIBER-TEMPERED POT AT FEET OF SKELETON IN BURIAL NO. 49. SITE LU° 59.



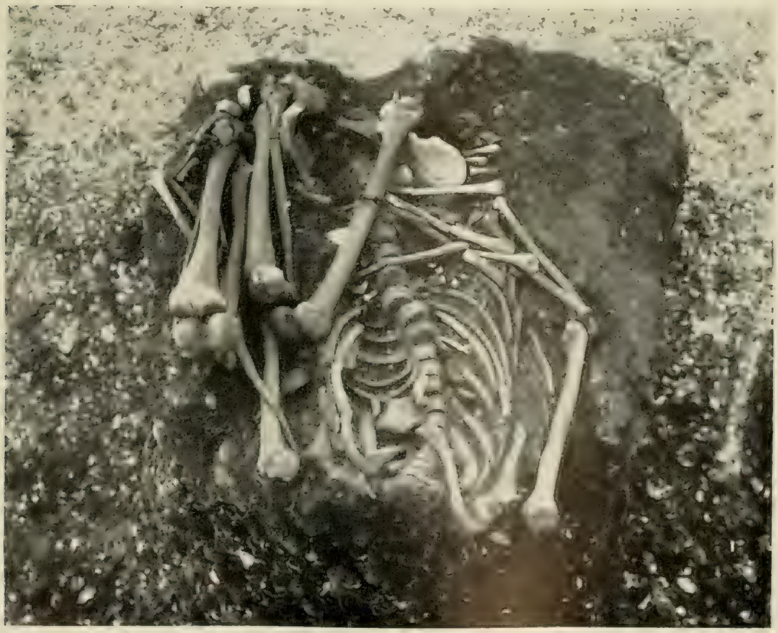
3. BURIAL NO. 91 (HEADLESS). SITE LU° 59.



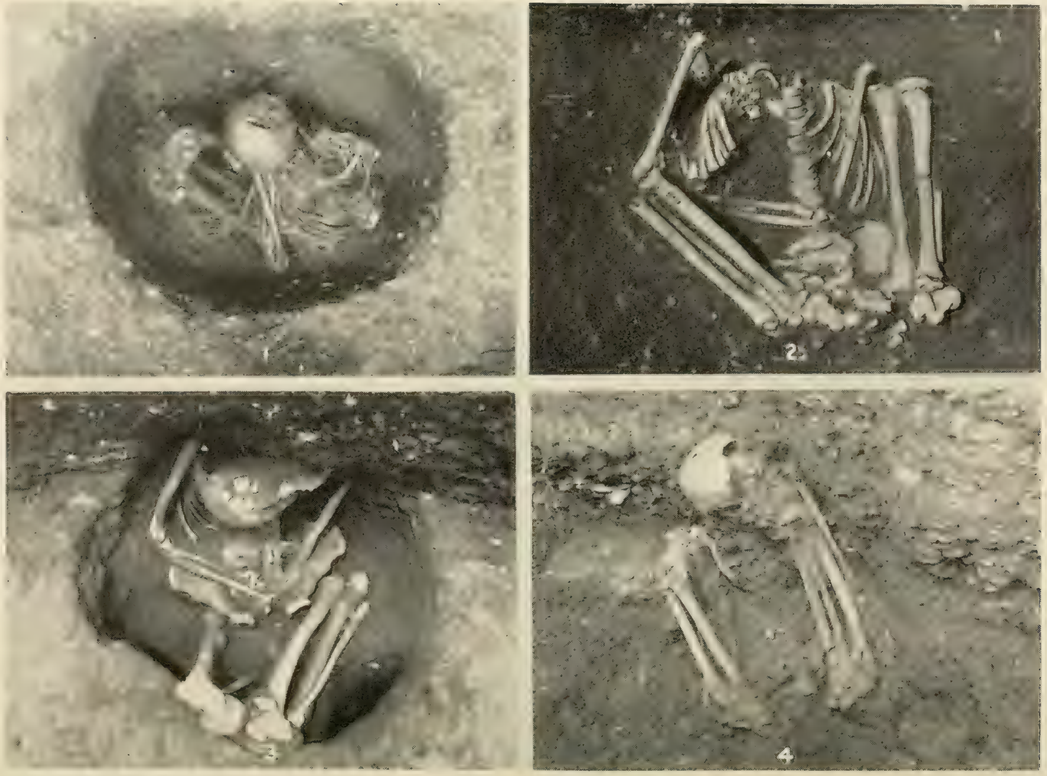
BURIAL NO. 75, TYPE 5A. SITE Lu° 59.



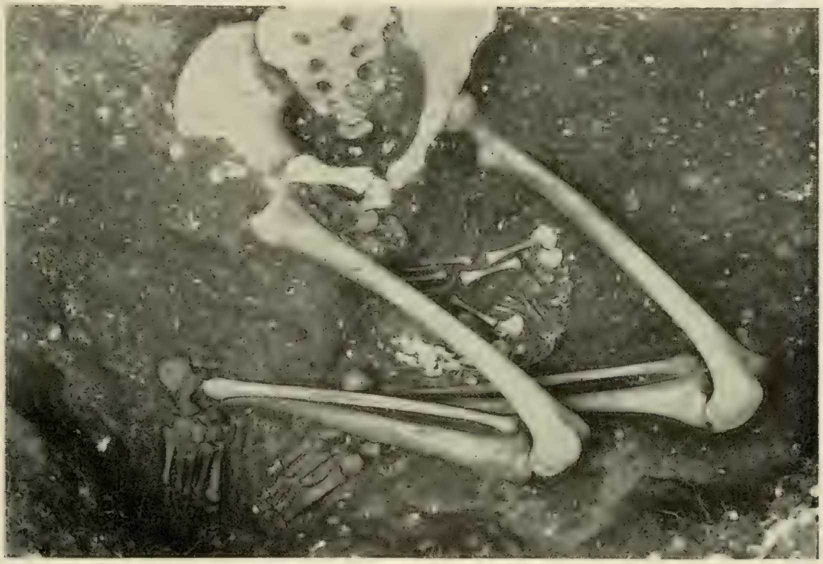
1. BURIAL NO. 131, WITH SHELL-TEMPERED POTTERY. SITE Lu° 59.



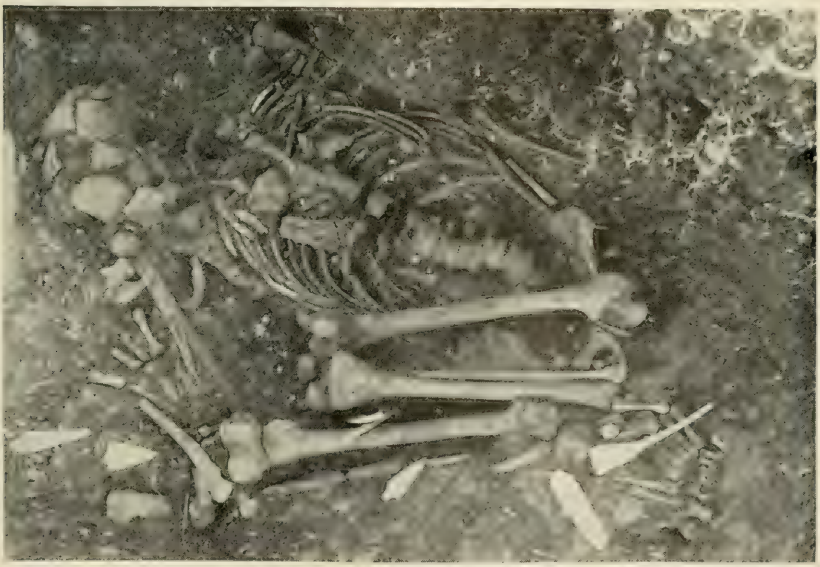
2. BURIAL NO. 60, TYPE 1B, HEADLESS. A PREHISTORIC DENTIST. SITE Lu° 59.



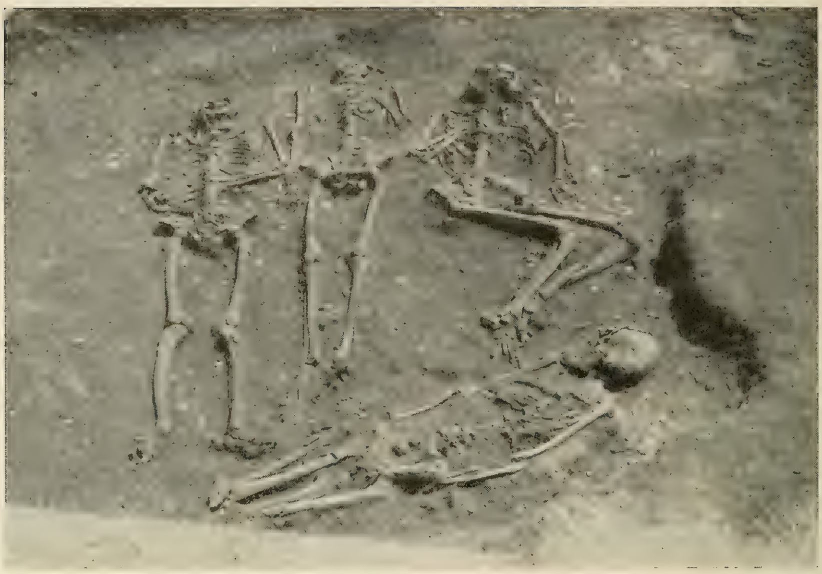
1. BURIAL NO. 107, IN PIT, TYPE 5A. 2. BURIAL NO. 149, HEADLESS, TYPE 5A. 3. BURIAL NO. 105, IN PIT, TYPE 5A. 4. BURIAL NO. 113
TYPE 5A. SITE LU° 59



1. BURIAL NO. 12. ADULT FEMALE, TYPE 3B AND BURIAL NO. 13, INFANT, POSSIBLY A POSTHUMOUS BIRTH. SITE LU° 59.

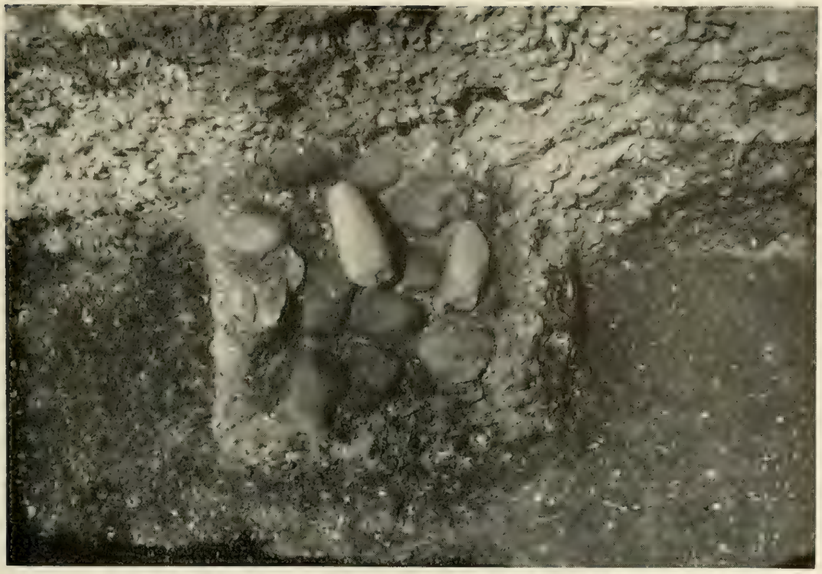


2. BURIAL NO. 86, TYPE 2A, WITH MANY ARTIFACTS. SITE LU° 59.



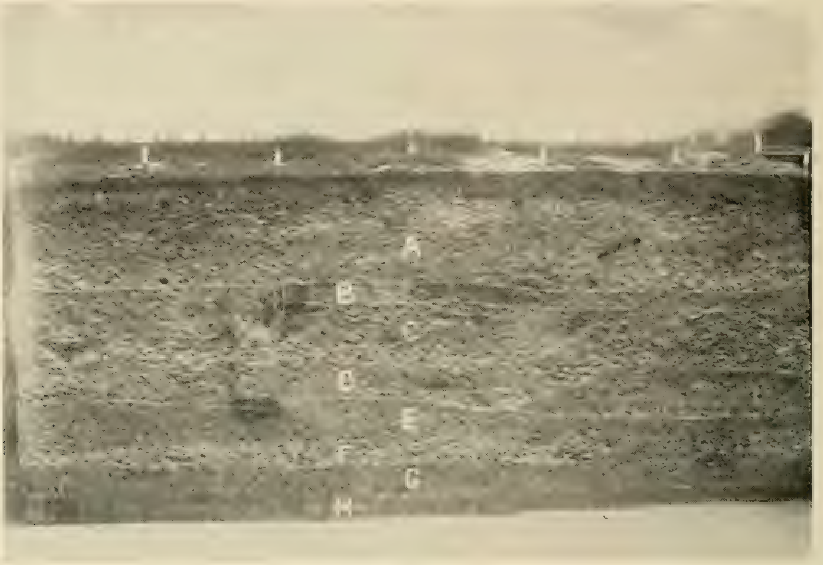
1. ASSOCIATED INTRUSIVE BURIALS NOS. 119–123, INCLUSIVE. SITE LU° 59.

2. DEPOSIT OF CREMATED REMAINS WITH ARTIFACTS. BURIAL NO. 111, TYPE 4A, SITE LU° 59.



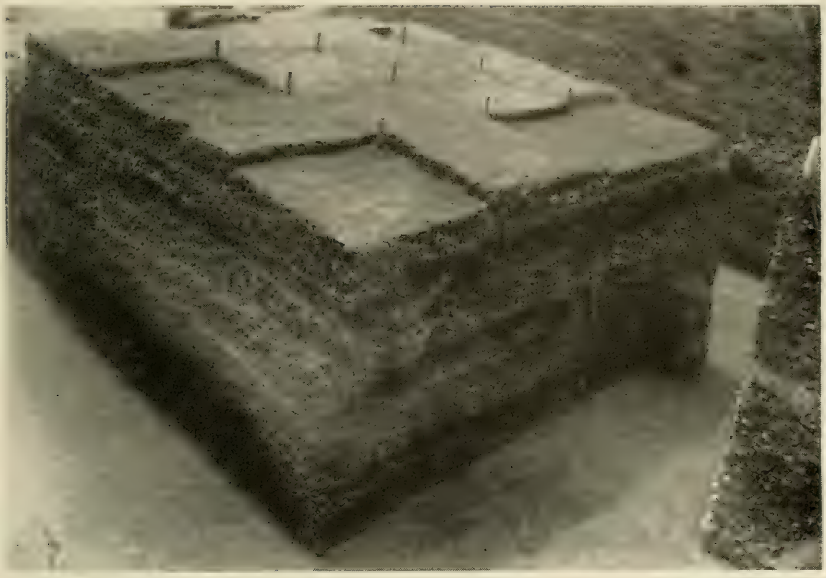
1. TYPICAL FIRE HEARTH CONTAINING BURNED RIVER PEBBLES, FEATURE NO. 8. SITE LU° 59.

2. FEATURE NO. 5. CLAY FLOOR WITH FIRE HEARTH. SITE LU° 59.

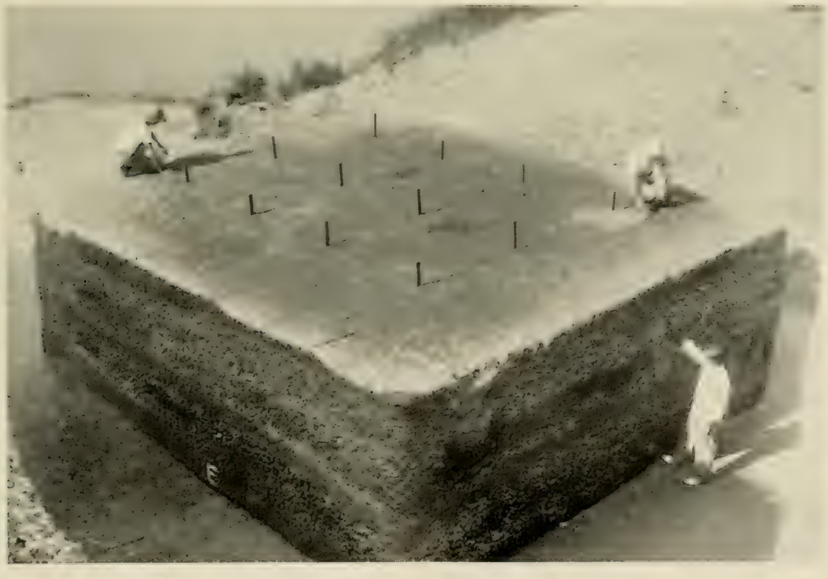


1. 160-Foot Profile Showing Natural Zones. Site Lu° 59.

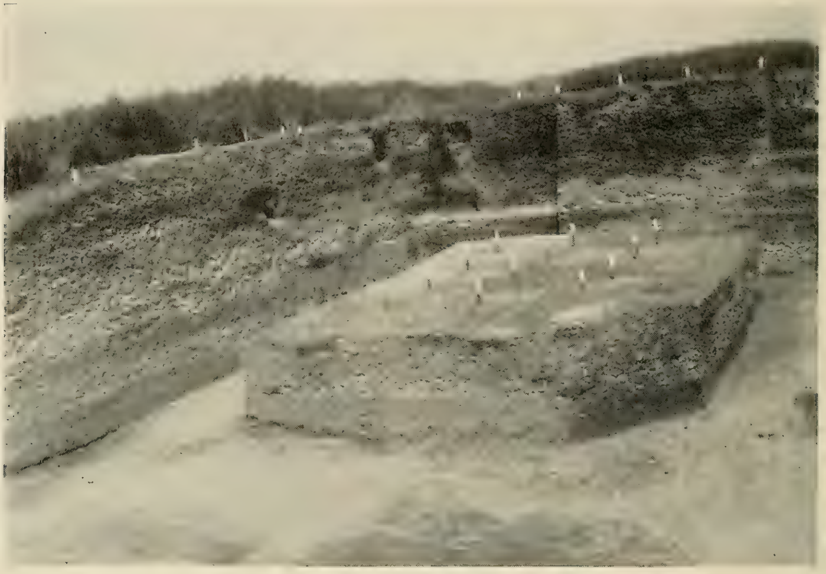
2. South Face of Block. 160-Foot Profile With 2 Feet of Zone A Removed.
Site Lu° 59.



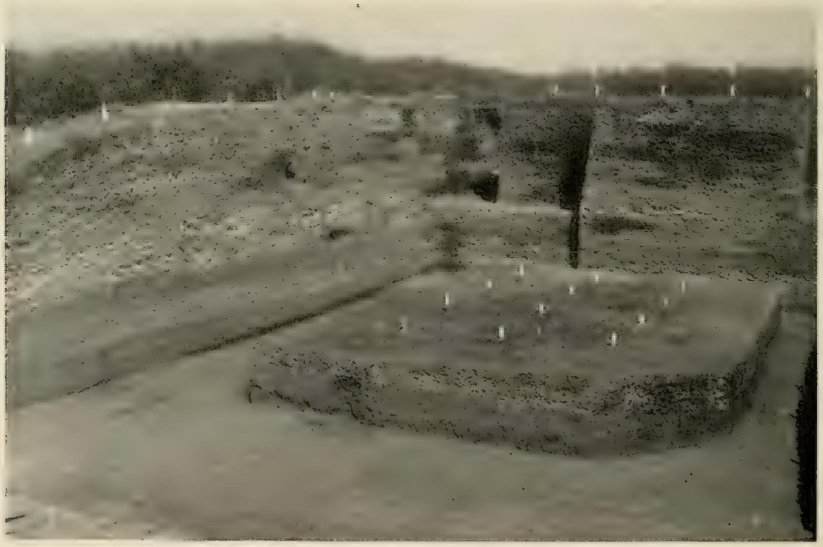
1. THE BLOCK, CUT DOWN IN 5-FOOT SQUARES, IN 6-INCH LEVELS BY NATURAL ZONES. SITE LU° 59.



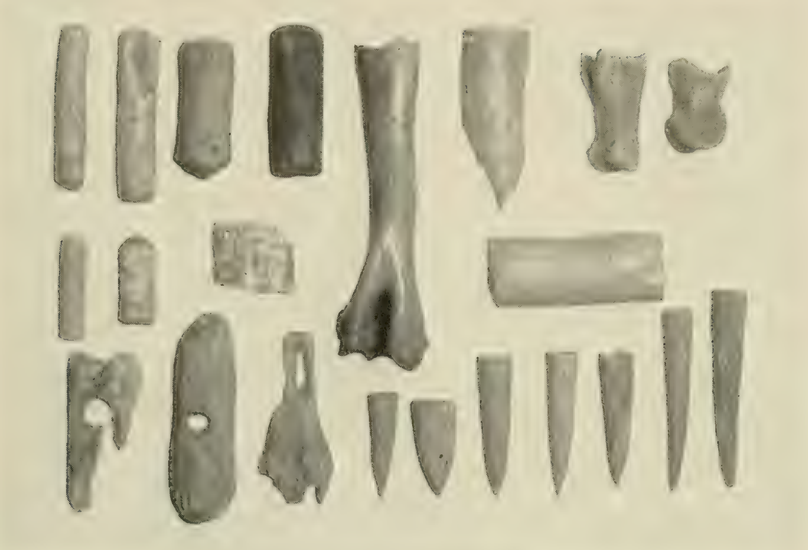
2. THE BLOCK: EACH ZONE BOUNDARY SEARCHED FOR FEATURES. SITE LU° 59.



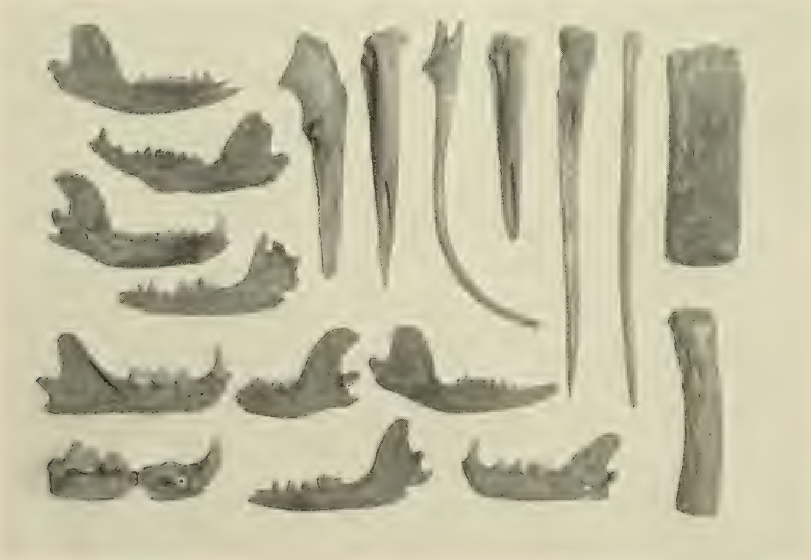
1. THE BLOCK; SURFACE OF ZONE E EXPOSED. SITE Lu° 59.



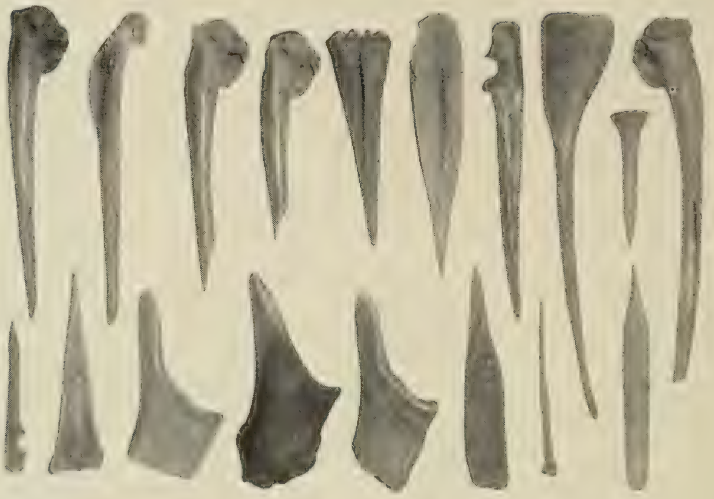
2. THE BLOCK; SURFACE OF ZONE G EXPOSED. SITE Lu° 59.



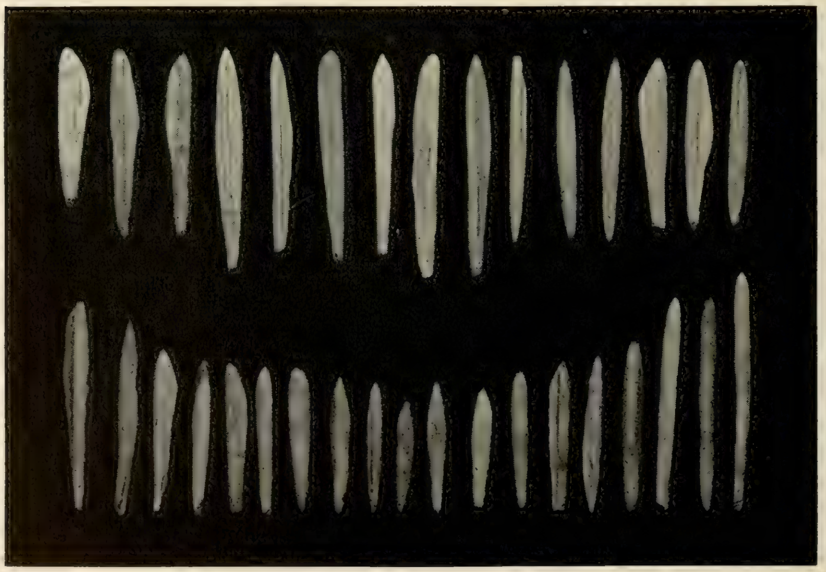
1. ARTIFACTS OF BONE AND ANTLER, DRIFTS, PROJECTILE POINTS, AND CUTBONE. SITE LU° 59.



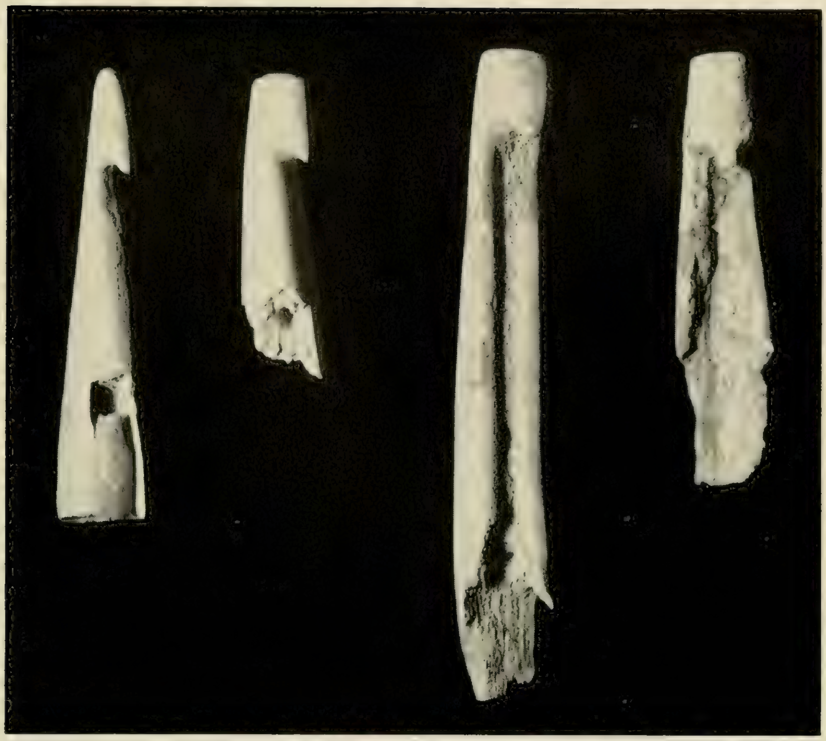
2. ARTIFACTS ASSOCIATED WITH BURIAL NO. 75. SITE LU° 59.



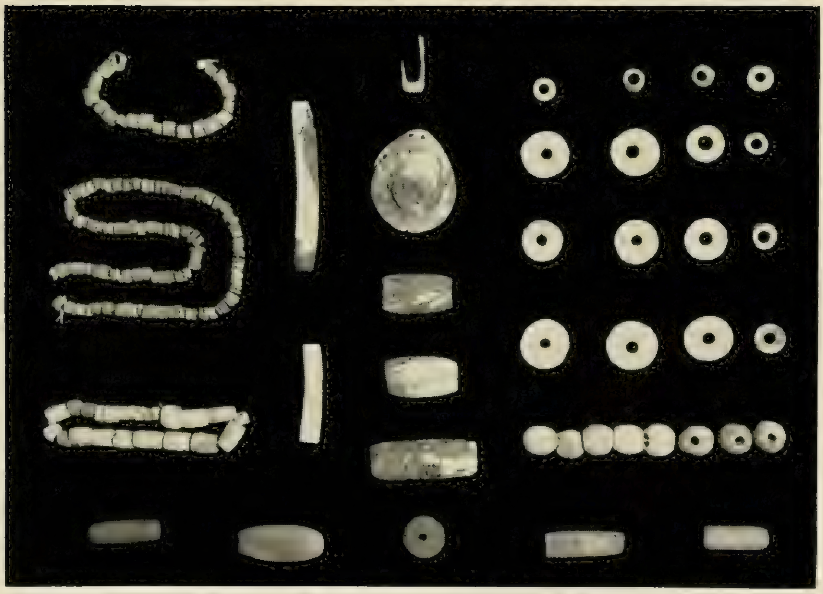
1. VARIOUS TYPES OF BONE AWLS MADE FROM ULNA AND CANNON BONE OF DEER, SCAPULA OF DEER, ULNA OF SMALL CARNIVORE, AND FEMUR OF LOON. SITE Lu° 59.



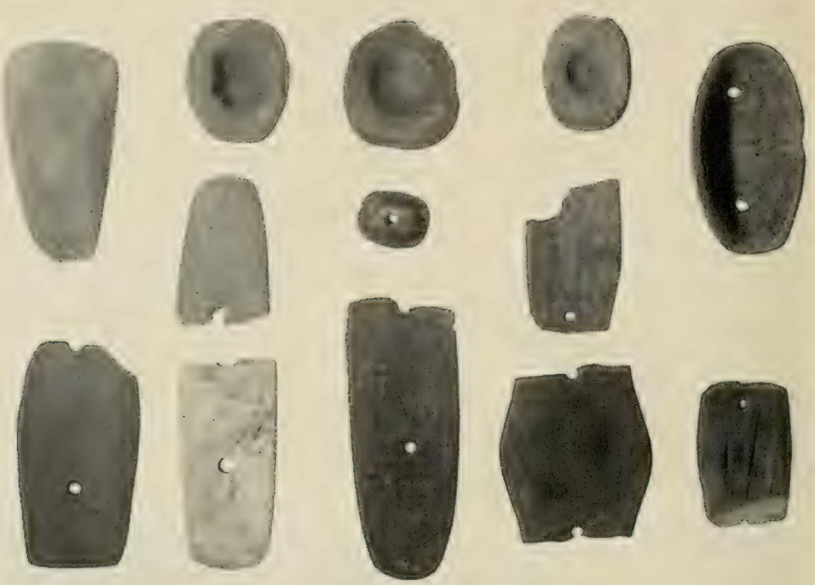
2. BONE PROJECTILE POINTS, MANY BATTERED ON POINT BY IMPACT. SITE Lu° 59



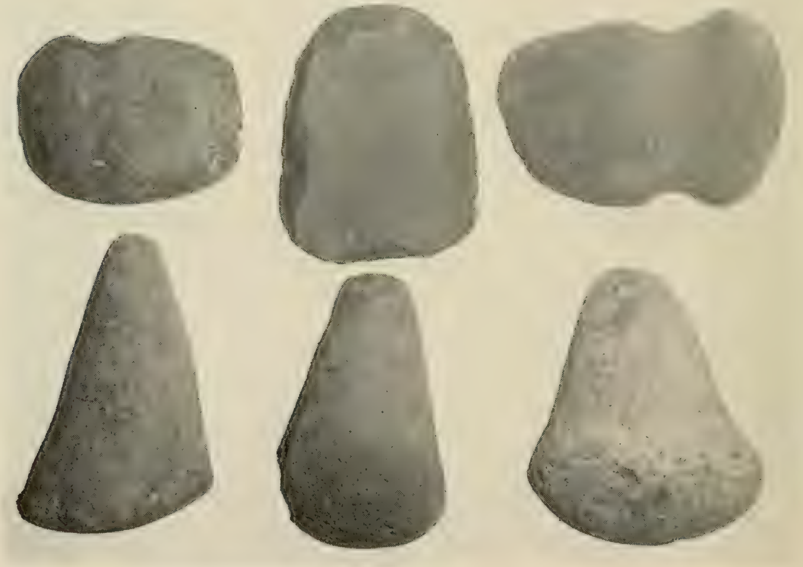
1. HORN ATLATL HOOKS. SITE Lu° 59.



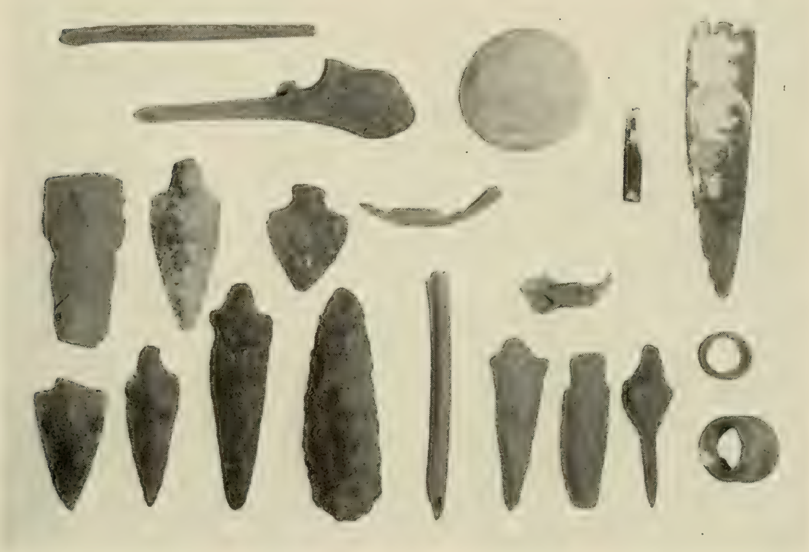
2. VARIOUS FORMS OF SHELL BEADS. SITE Lu° 59.



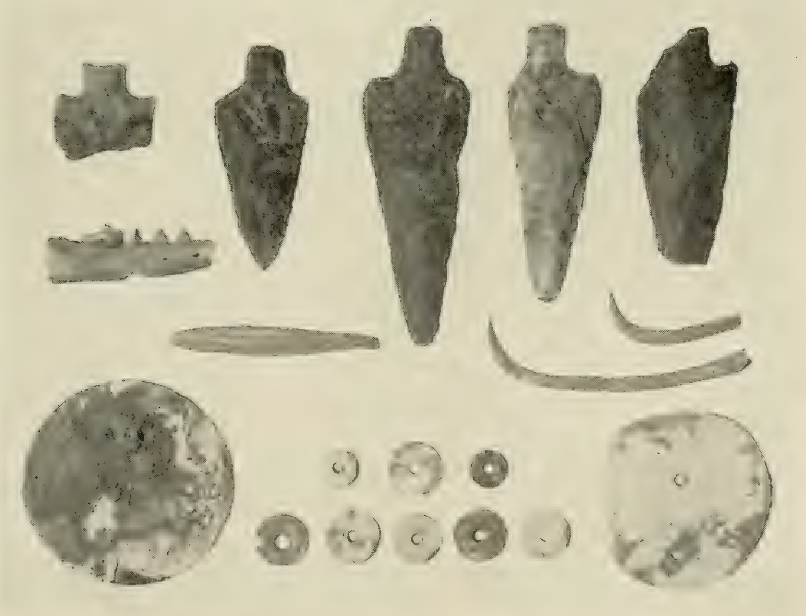
1. STONE ARTIFACTS, BAR GORGETS, BOATSTONE, AND DRILL SOCKETS. SITE Lu° 59.



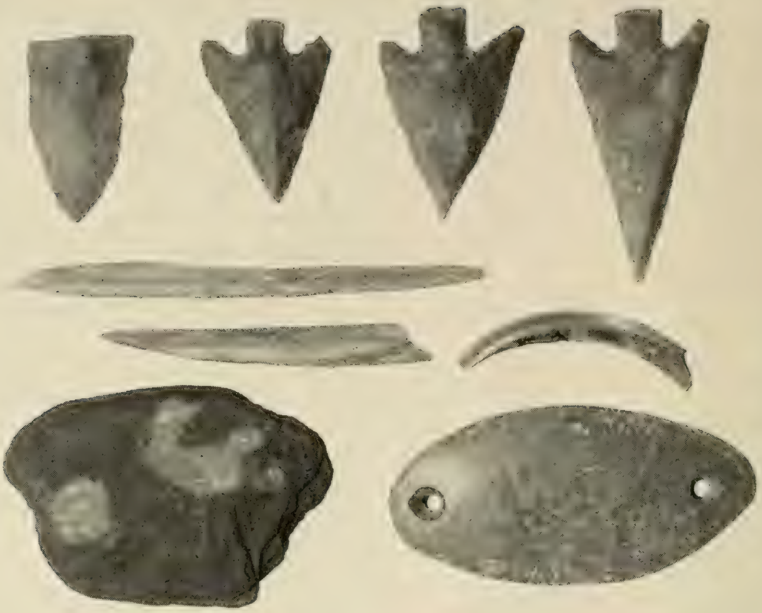
2. PESTLES, HOE, AND GROOVED AXES. SITE Lu° 59.



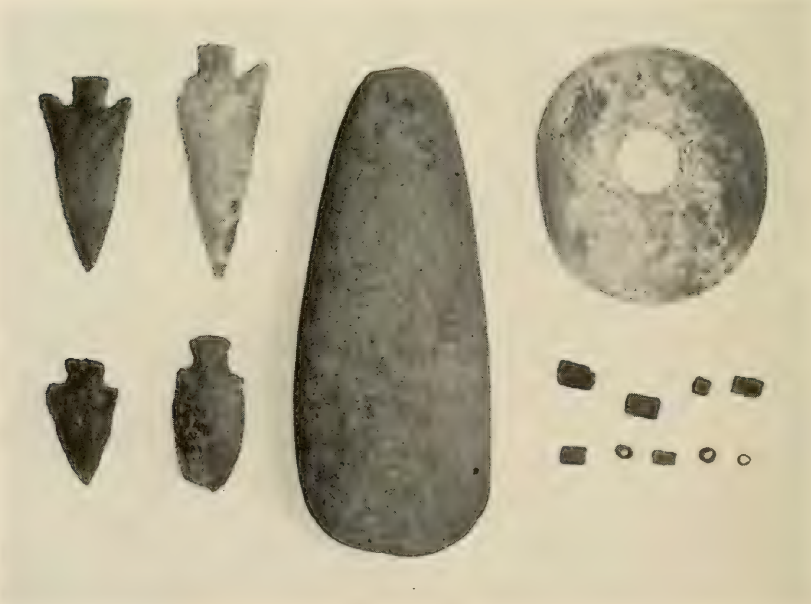
1. ARTIFACTS WITH BURIALS NOS. 86, 91, 157, AND 183. SITE Lu° 59.



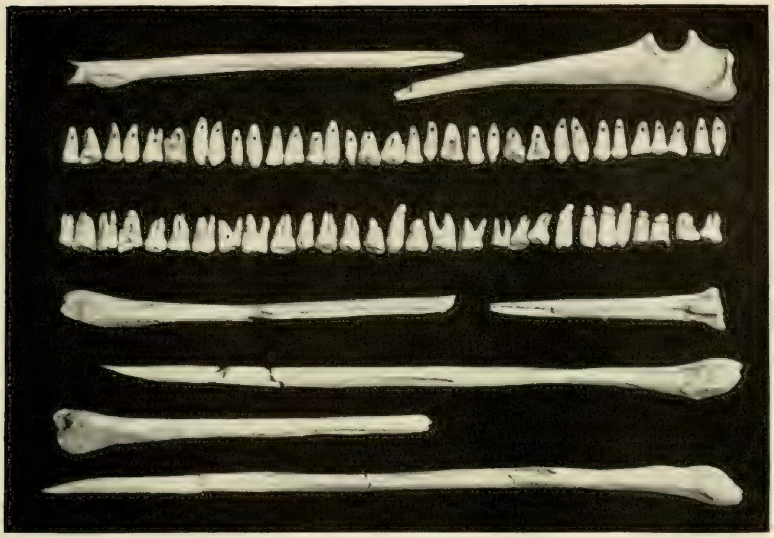
2. ARTIFACTS WITH BURIALS NOS. 78, 81, AND 160. SITE Lu° 59.



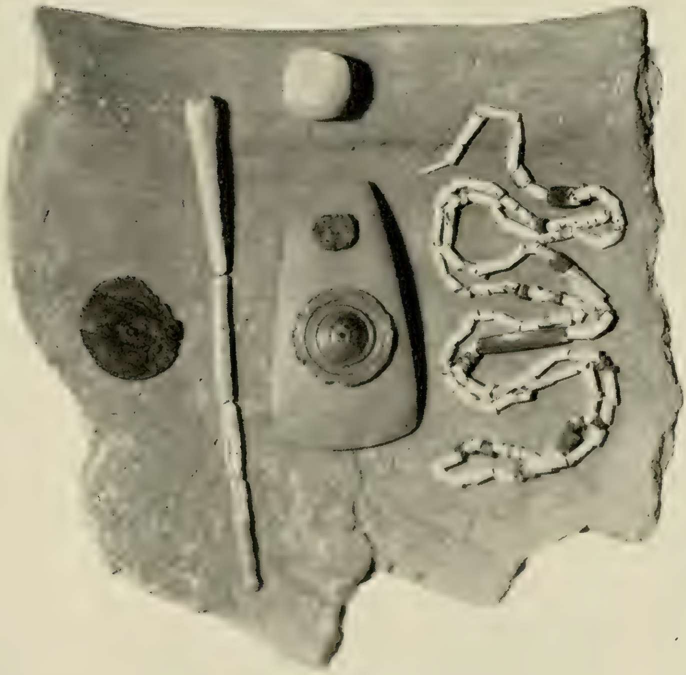
1. ARTIFACTS WITH BURIAL NO. 66. SITE LU° 59.



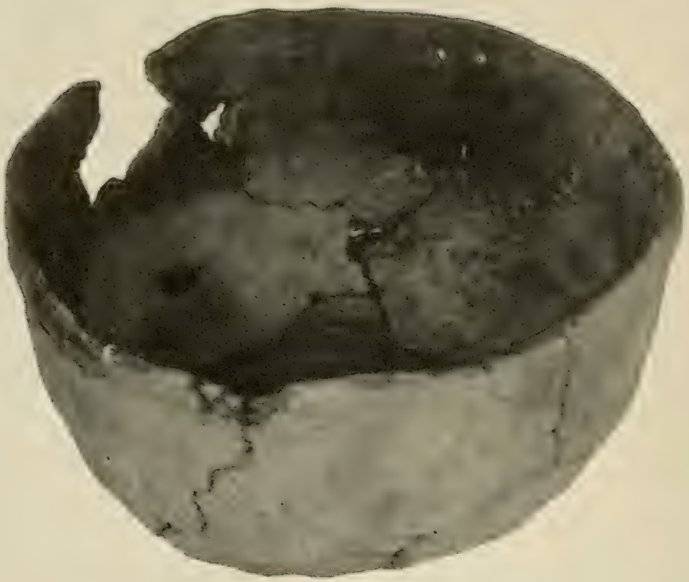
2. ARTIFACTS WITH BURIALS NOS. 70 AND 75. SITE LU° 59.



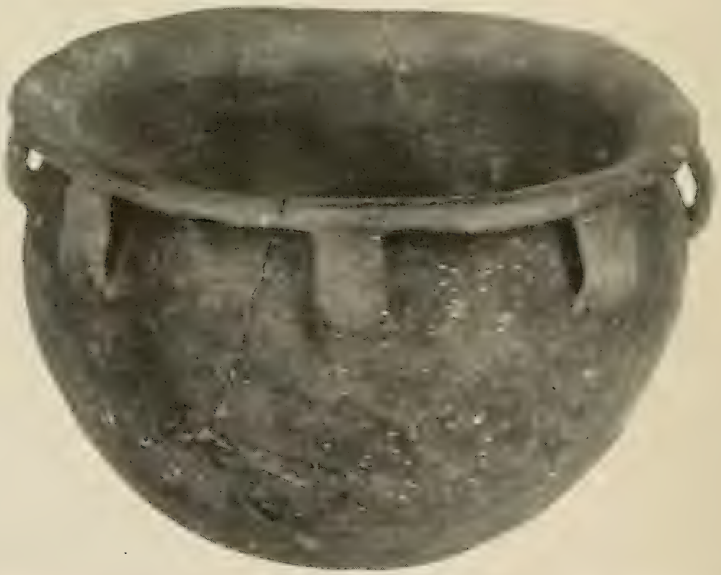
1. ARTIFACTS ASSOCIATED WITH BURIAL NO. 60. SITE Lu° 59.



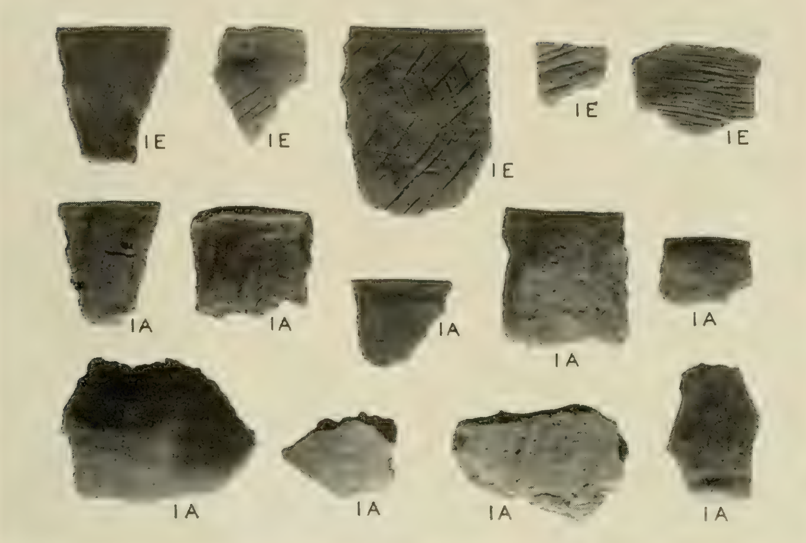
2. ARTIFACTS ASSOCIATED WITH BURIAL NO. 11. SITE Lu° 59.



1. FIBER-TEMPERED VESSEL, BURIAL NO. 49. SITE LU° 59.



2. SHELL-TEMPERED VESSEL, 9 STRAP HANDLES, BURIAL NO. 131. SITE LU° 59.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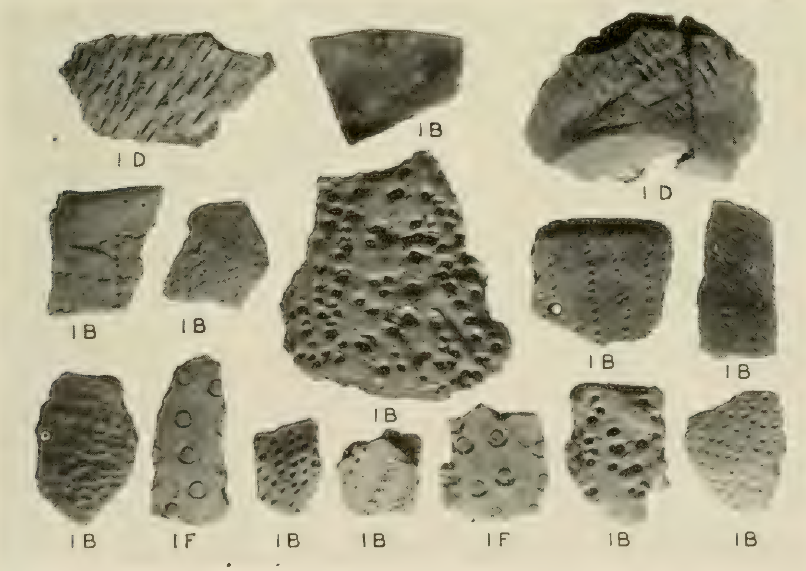
1. DECORATED SHERDS, FIBER-TEMPERED POTTERY, TYPE 1A. SITE LU° 59.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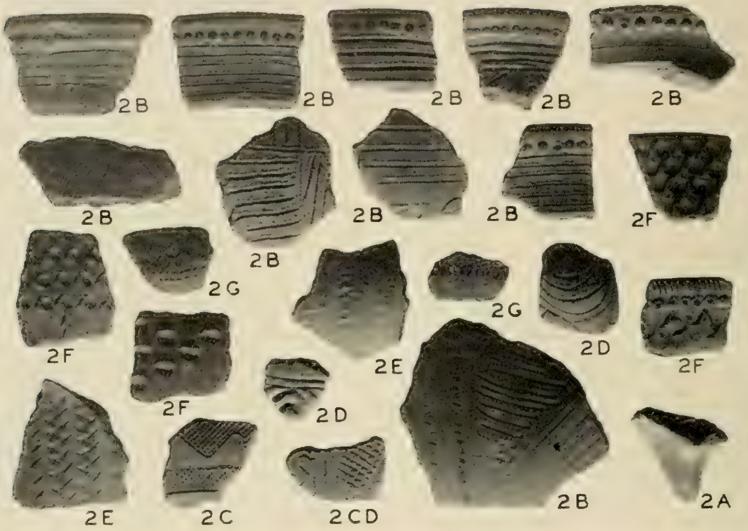
2. DECORATED SHERDS, FIBER-TEMPERED POTTERY, TYPE 1B. SITE LU° 59.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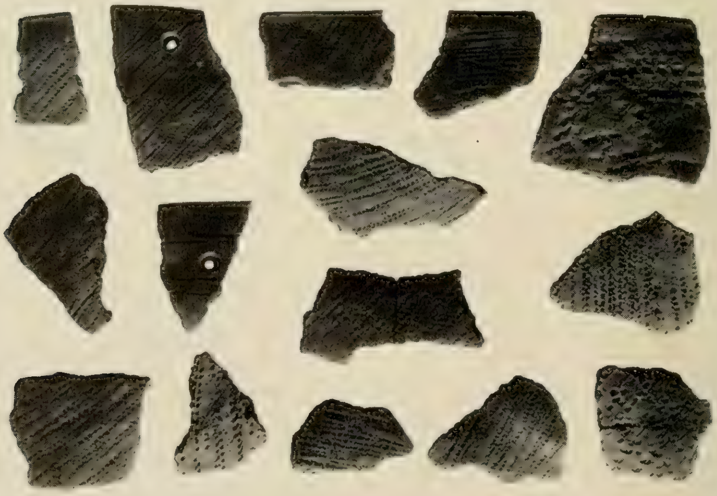
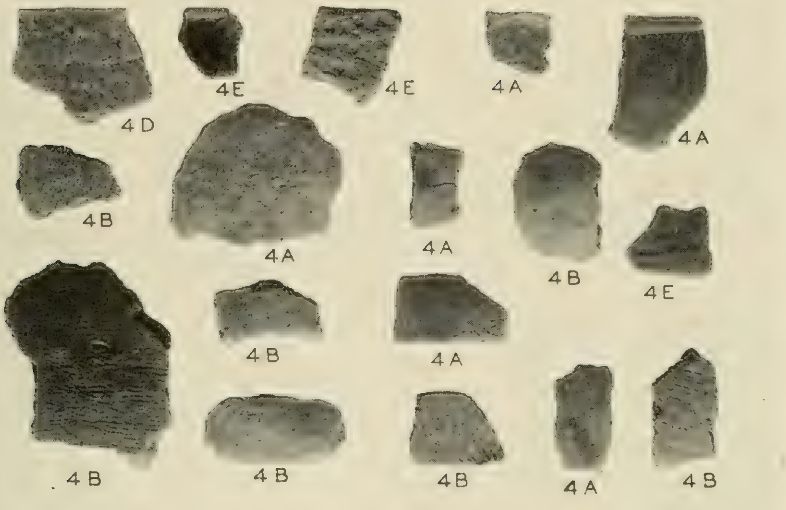
1. DECORATED SHERDS. SAND-TEMPERED POTTERY, TYPE 2. SITE LU° 59.



2. DECORATED SHERDS. FIBER-TEMPERED POTTERY, TYPE 1C. SITE LU° 59.


4E
4E
4A
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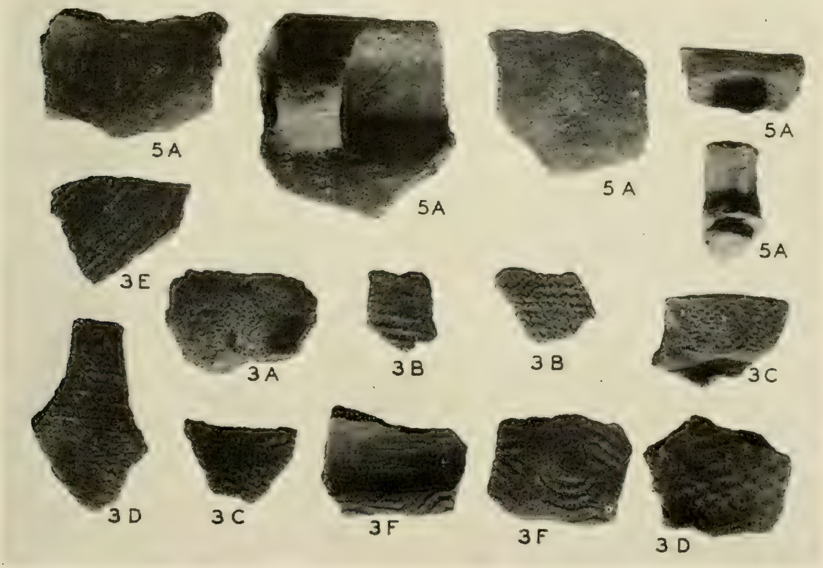
1. DECORATED SHERDS, CLAY-GRIT-TEMPERED POTTERY, TYPE 4. SITE LU° 59.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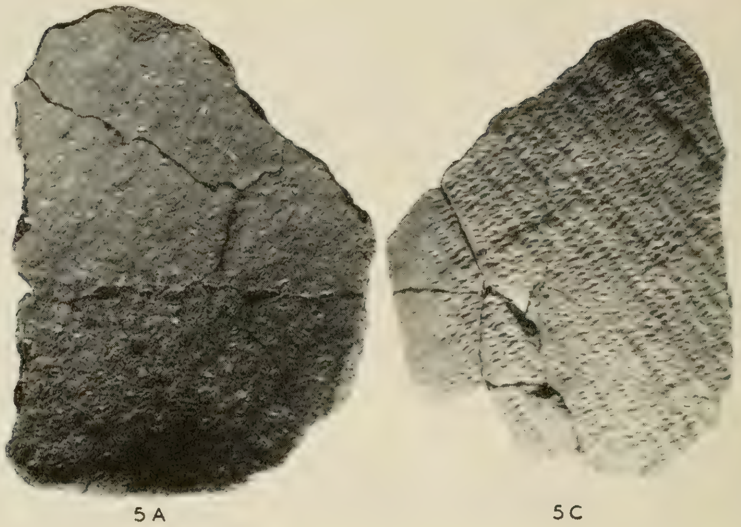
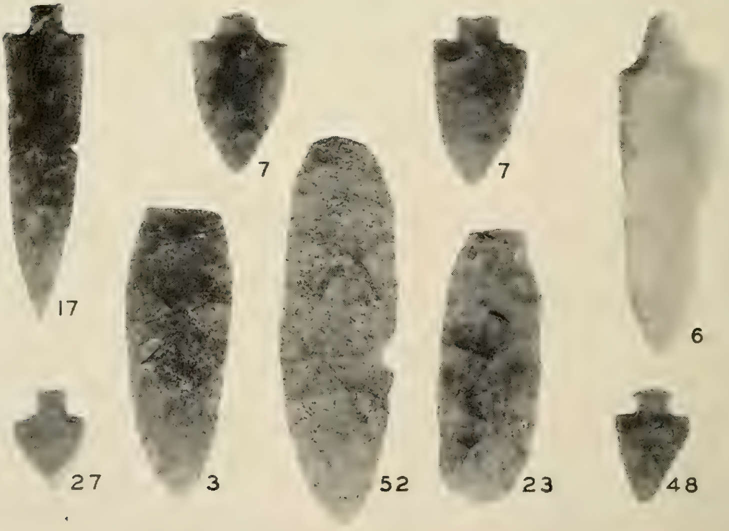
2. DECORATED SHERDS, SHELL AND LIMESTONE-TEMPERED POTTERY. TYPES 5 AND 3. SITE LU° 59.



1. DECORATED SHERDS, SHELL-TEMPERED POTTERY, TYPE 5. SITE LU° 59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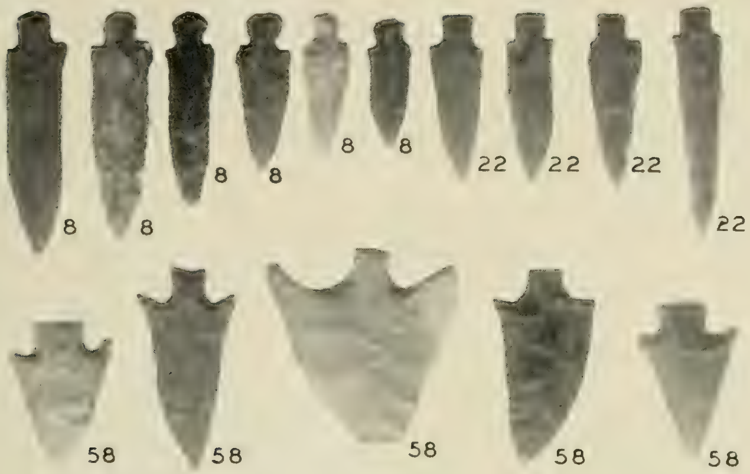
2. FLINT TYPES AS DESIGNATED BY NUMBER. SITE LU° 59.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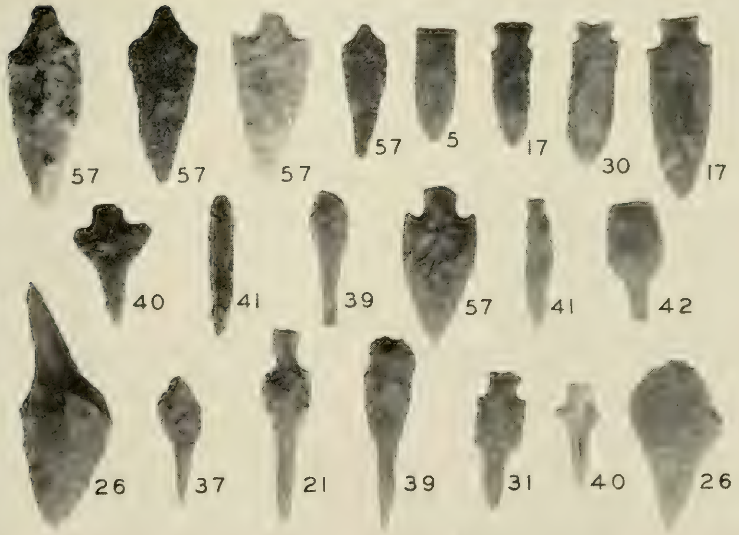
1. Flint Types 8, 22, and 58. Site Lu° 59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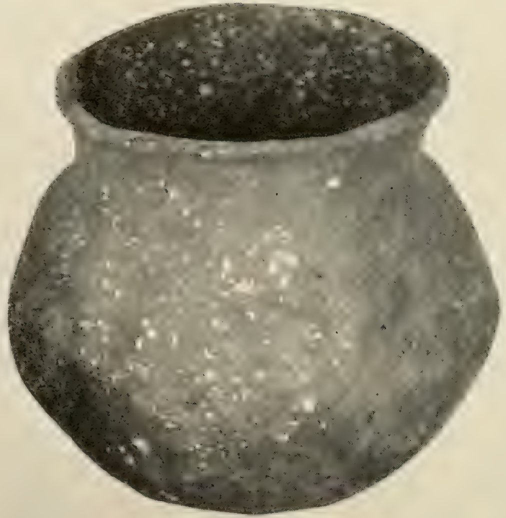
26

2. Flint Types as Designated by Number. Site Lu° 59.



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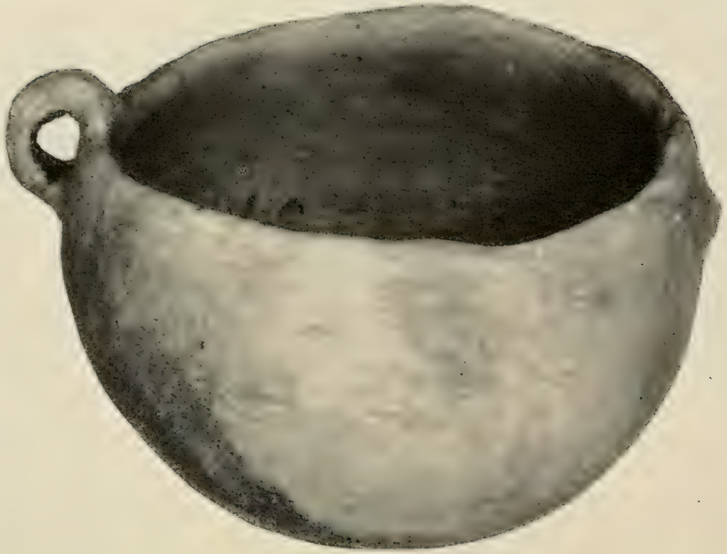

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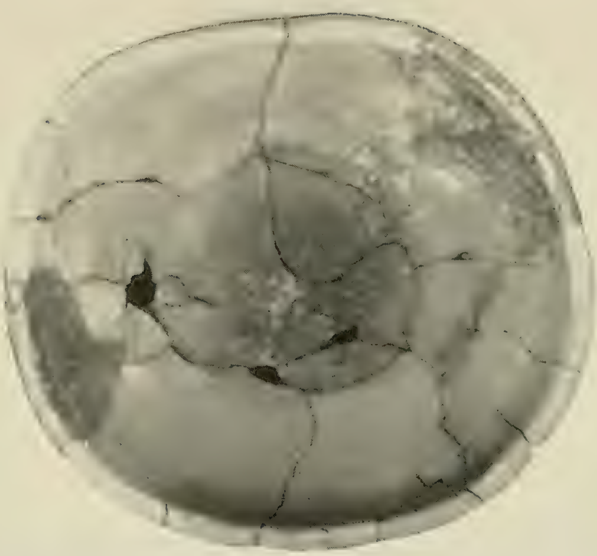
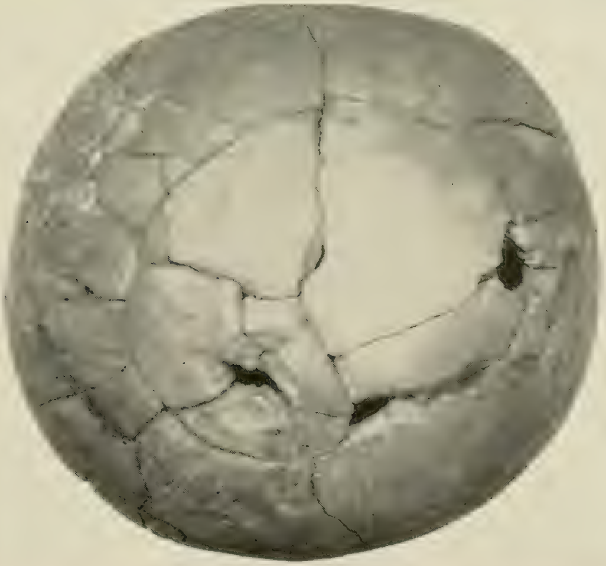
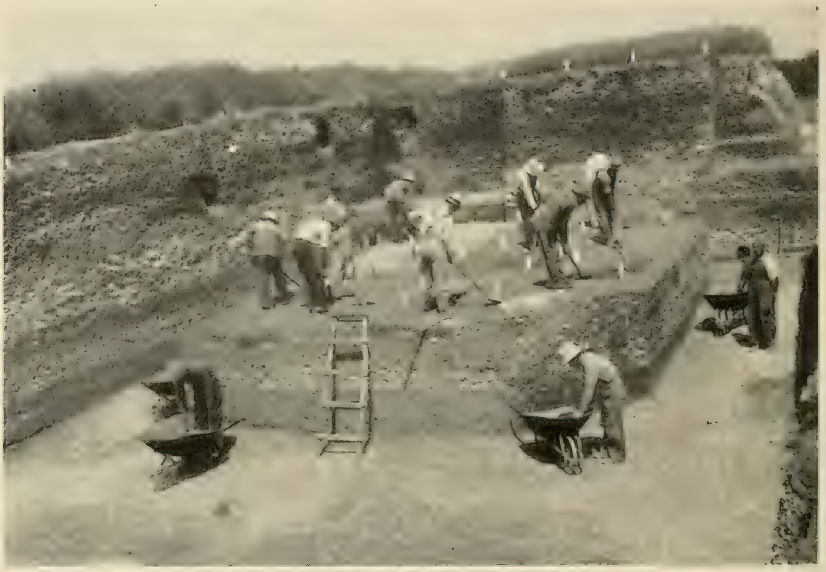
1. Shell-Tempered Vessel, Burial No. 2. 2. Shell-Tempered Vessel, Burial No. 12. Site Lu° 59.



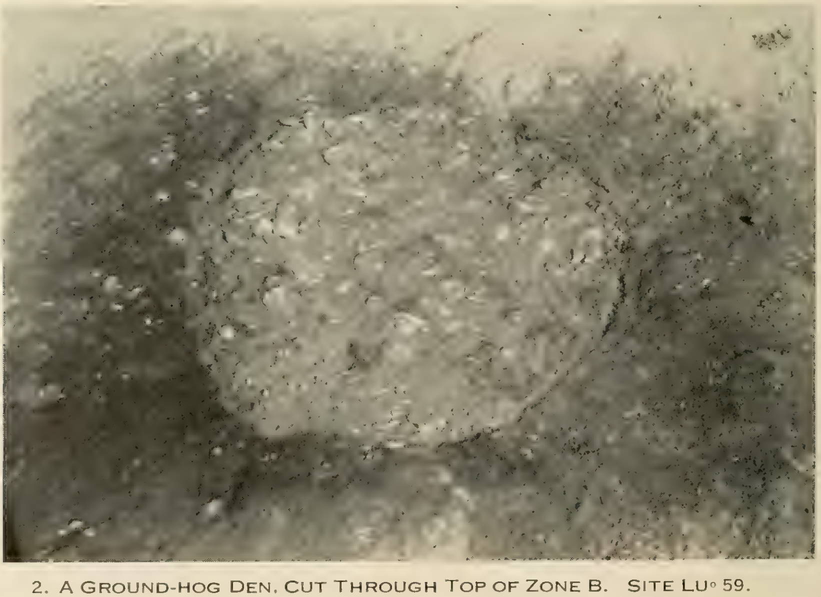
1. SANDSTONE BOWL BROKEN AND RESTORED. BURIAL NO. 147. SITE LU° 59.



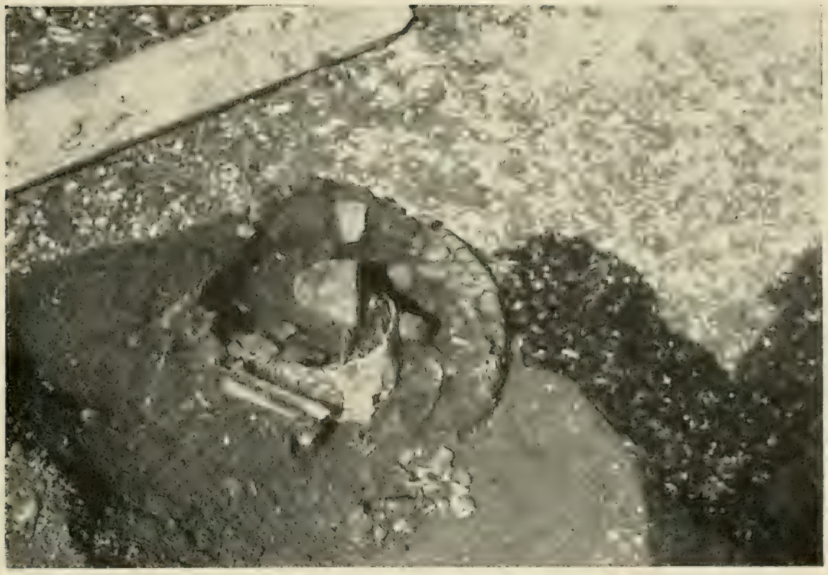
2. SANDSTONE BOWL INVERTED, SHOWING CHISEL MARKS. SITE LU° 59



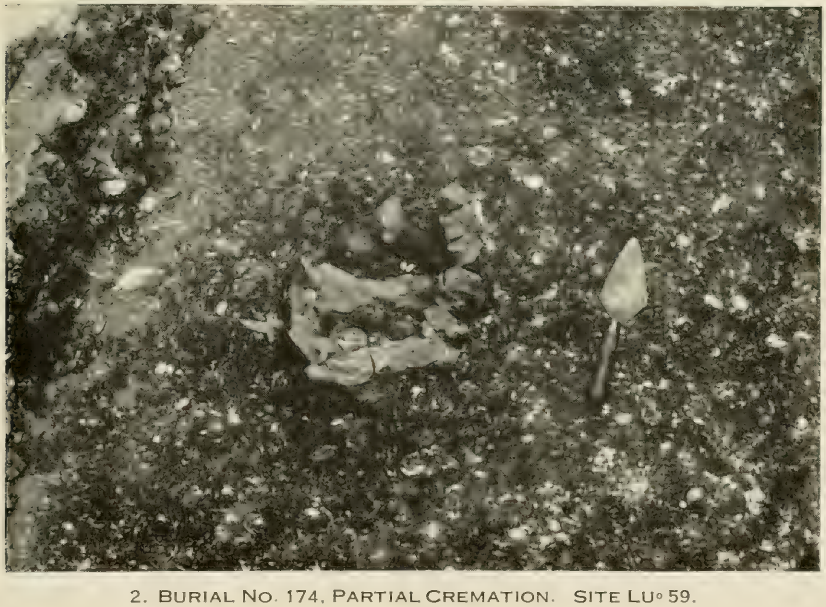
1. TECHNIQUE OF EXCAVATING THE CENTRAL BLOCK IN 6-INCH LEVELS. SITE Lu° 59.



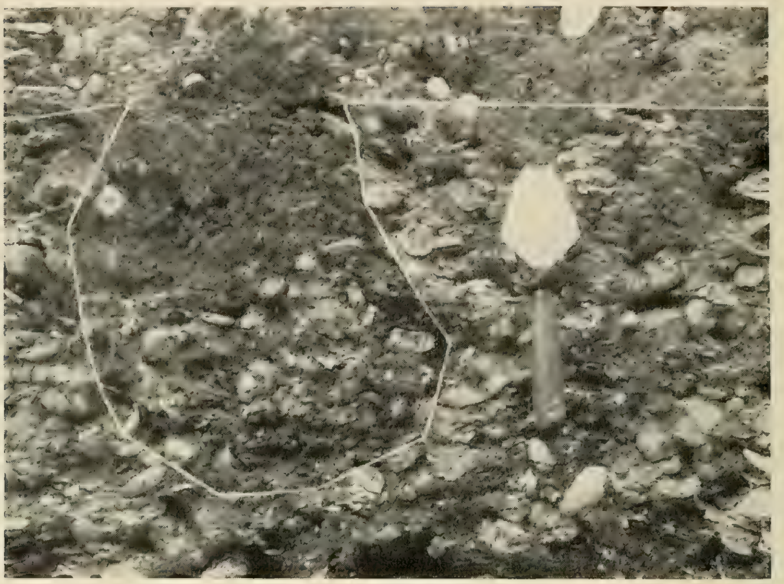
2. A GROUND-HOG DEN, CUT THROUGH TOP OF ZONE B. SITE Lu° 59.



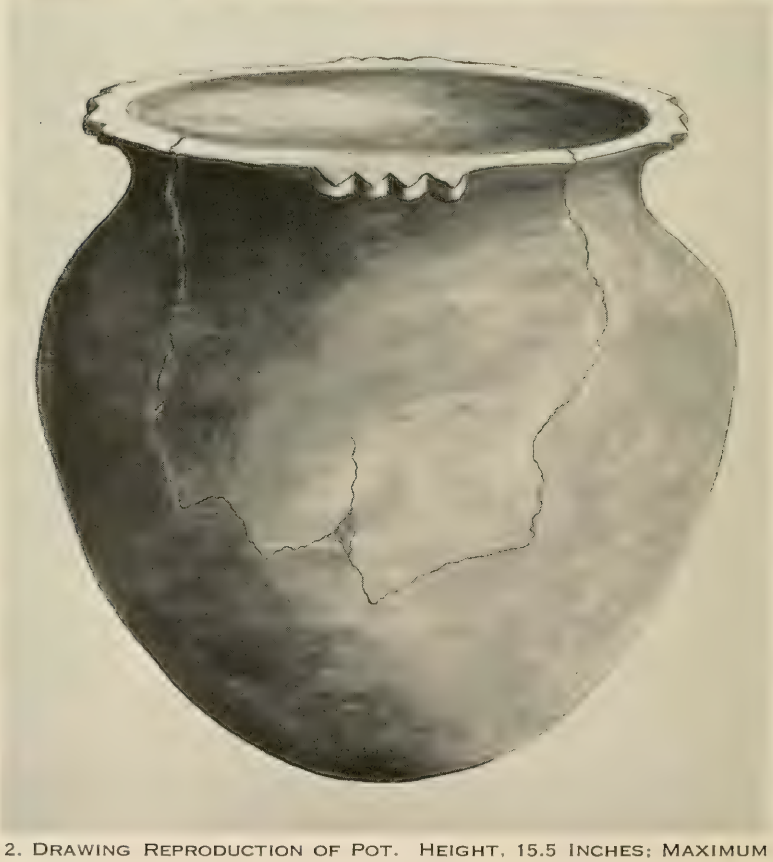
1. BURIAL NO. 166, PARTIAL CREMATION. SITE Lu° 59.



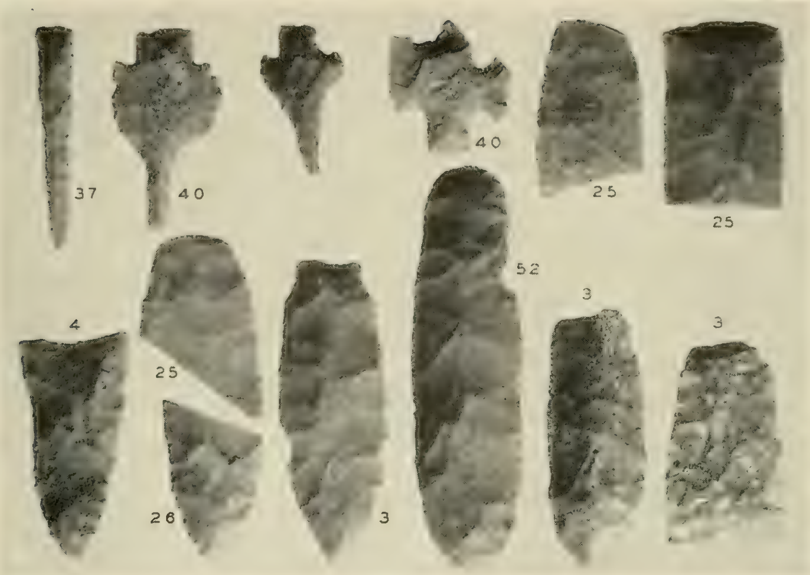
2. BURIAL NO. 174, PARTIAL CREMATION. SITE Lu° 59.



1. BURIAL NO. 186, TOTAL CREMATION. SITE LU° 59.



2. DRAWING REPRODUCTION OF POT. HEIGHT, 15.5 INCHES; MAXIMUM DIAMETER, 16 INCHES; MOUTH DIAMETER, 12 INCHES. SITE LU° 59.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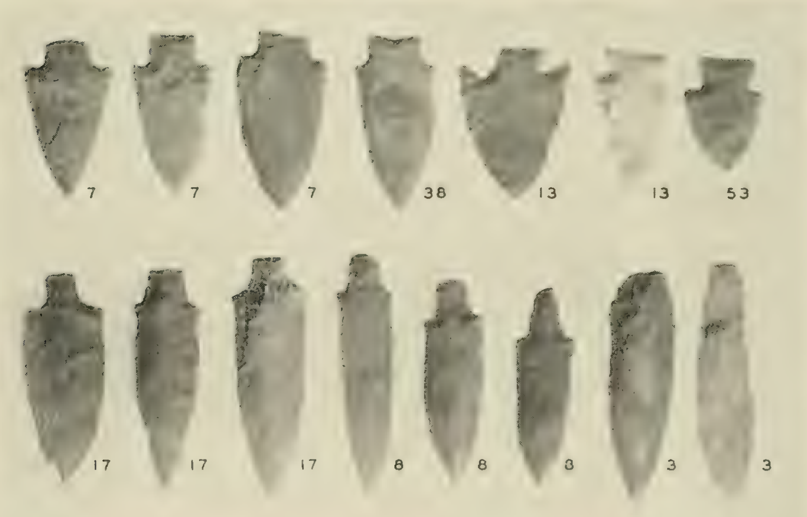
1. FLINT TYPES. SITE LU° 61.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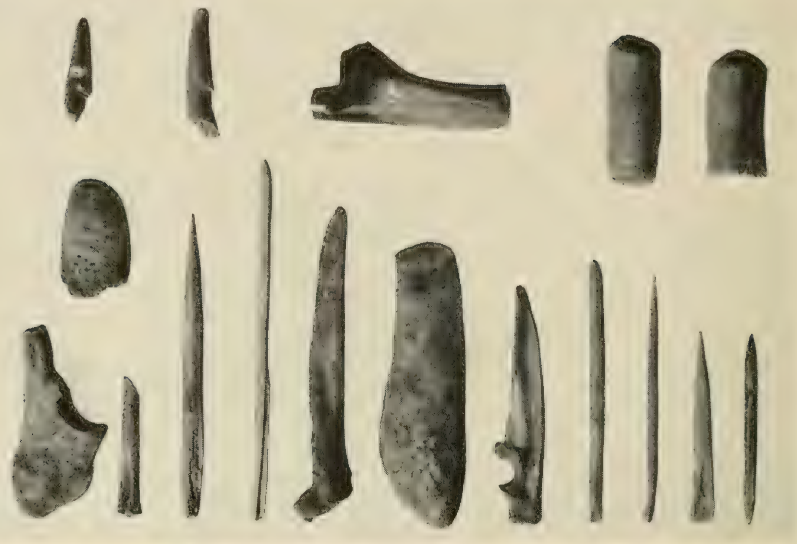
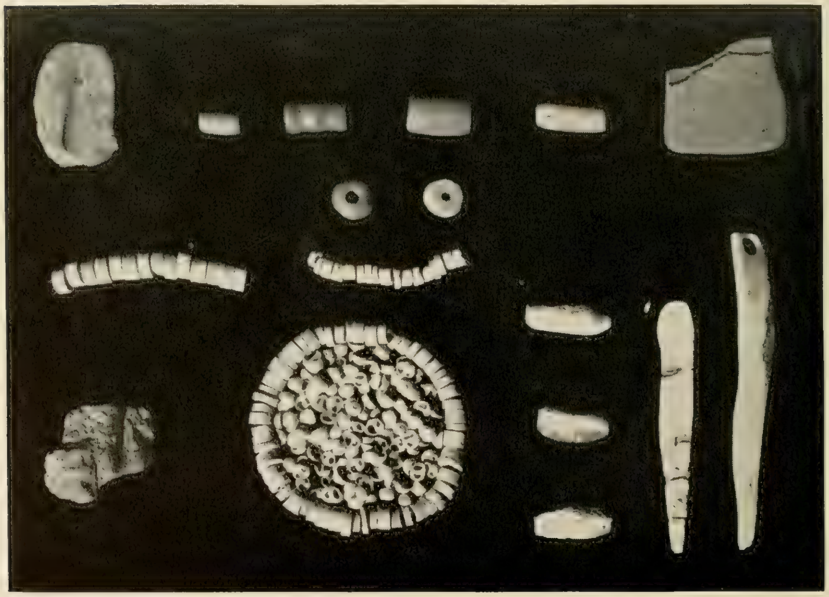
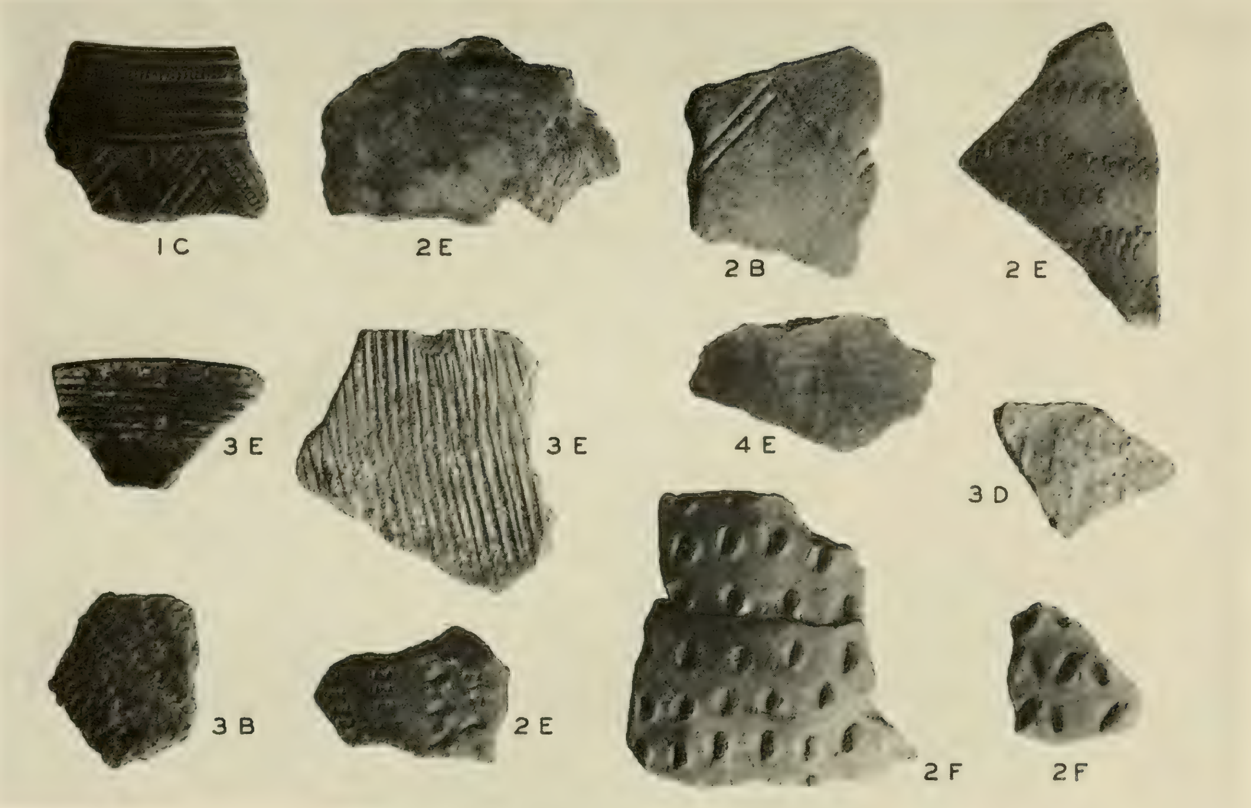
2. FLINT TYPES. SITE LU° 61.



1. BONE AWLS AND ANTLER ARTIFACTS. SITE Lu° 61.



2. SHELL BEADS AND PENDANTS. SITE Lu° 61.


1 C
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3 D
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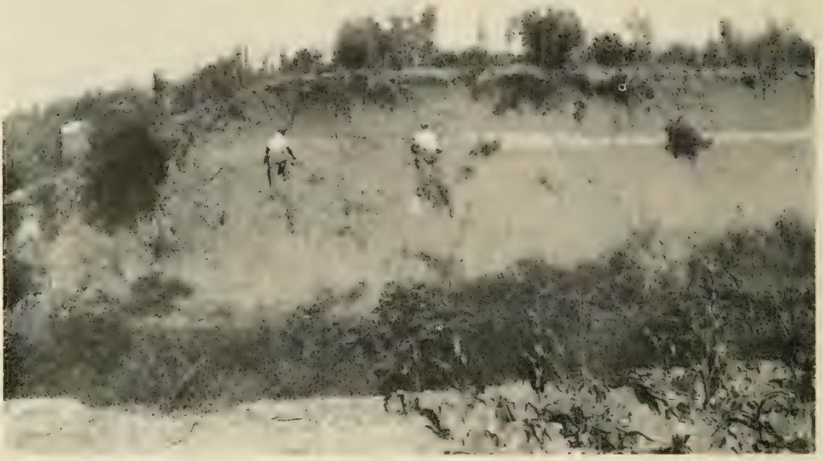
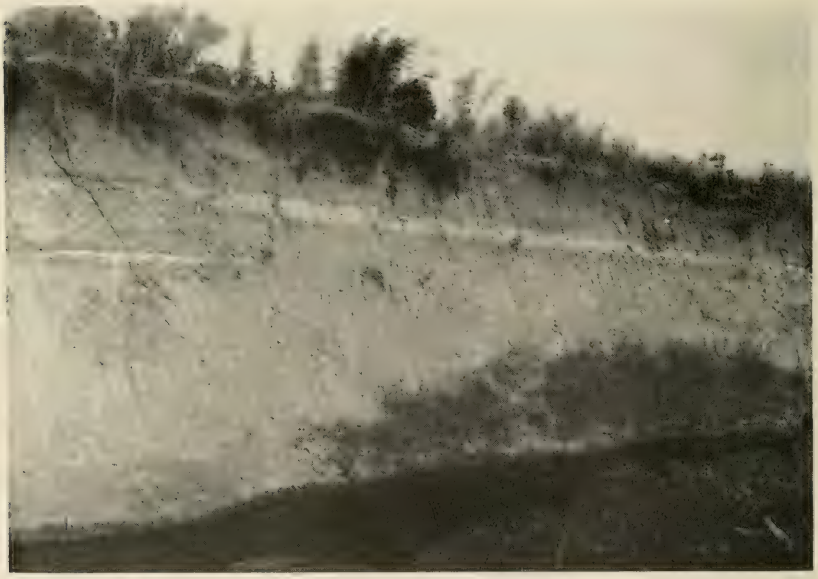
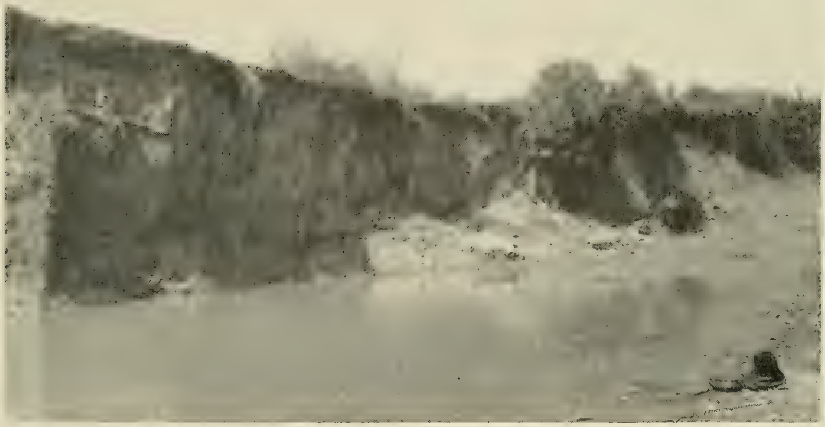
Pottery Types. Site Lu° 61.



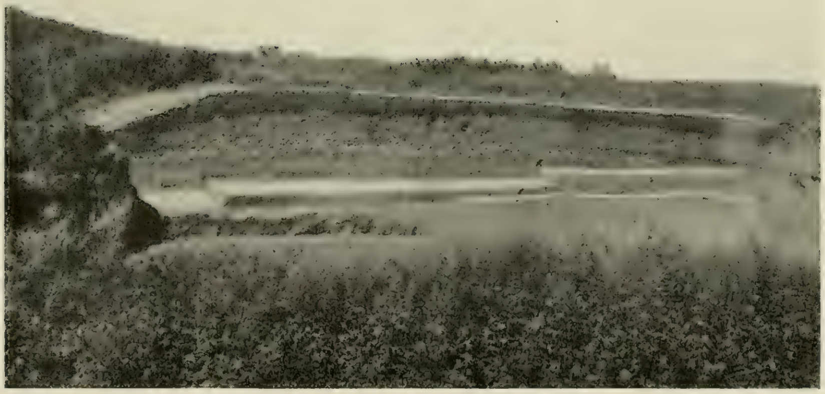
1. EXPOSING SHELL LAYER IN MEANDER SCAR, MOUTH OF BLUFF CREEK, AUGUST 1936. SITE LUᵛ 62.



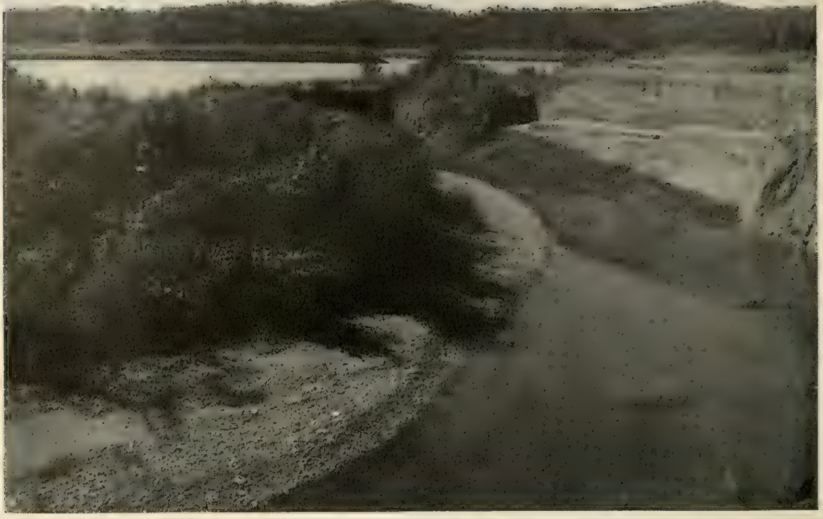
2. NATURAL PROFILE EXPOSED. NOTE SECOND LOWER SHELL LAYER JUST VISIBLE, AUGUST 1936. SITE LUᵛ 62.



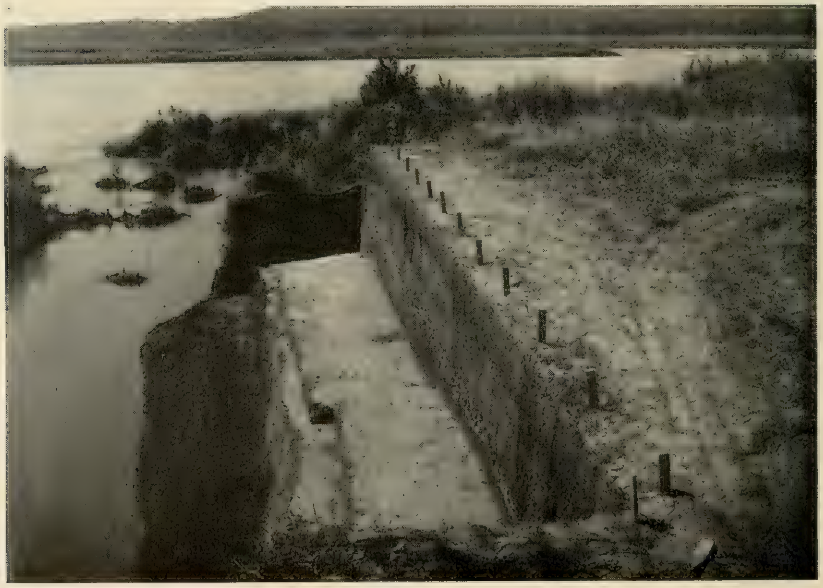
1. EROSION OF SITE LU^v 62, WINTER OF 1936.



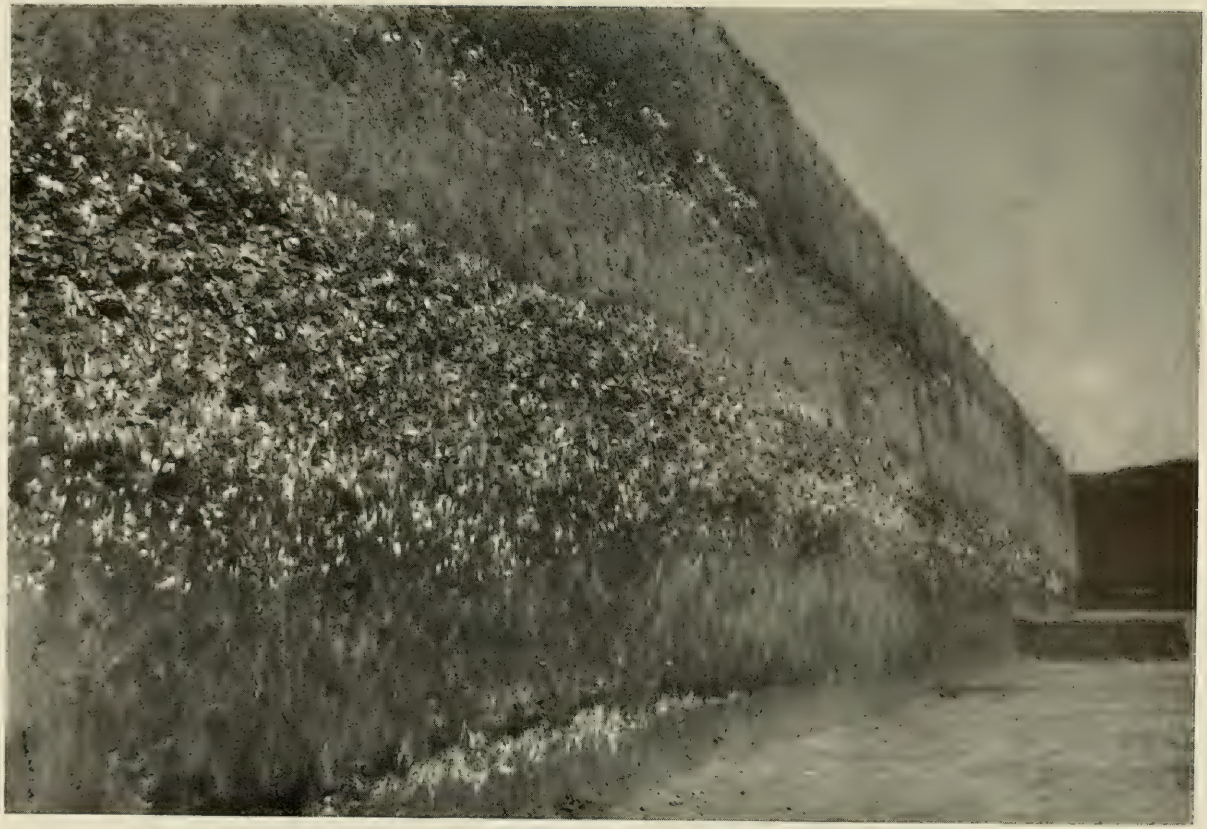
2. PROFILE CUT TO EXPOSE SHELL LAYERS, LOOKING EAST. SITE LU^v 62.



1. Site Lu^{v} 62. Looking Down Bluff Creek.

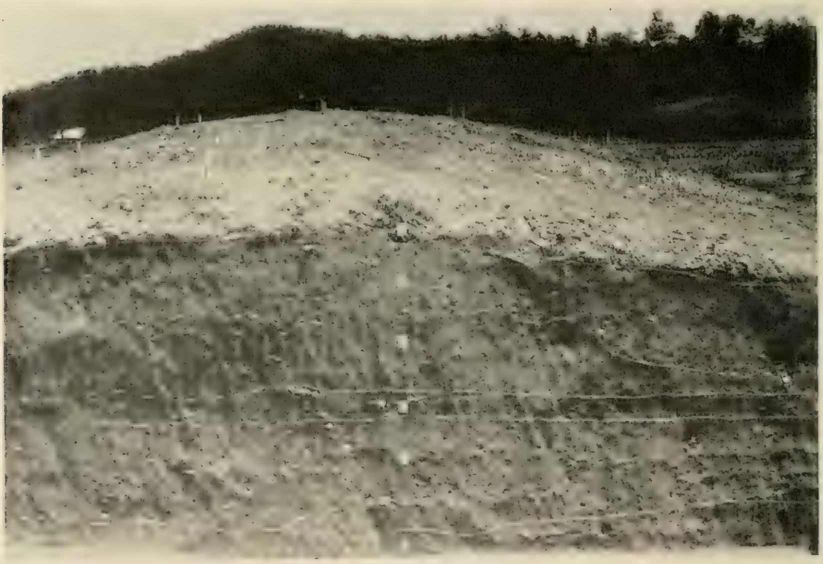


2. Above the Site, Showing Mouth of Bluff Creek, the Tennessee River, and Large Island Opposite Creek Mouth. Site Lu^{v} 62.

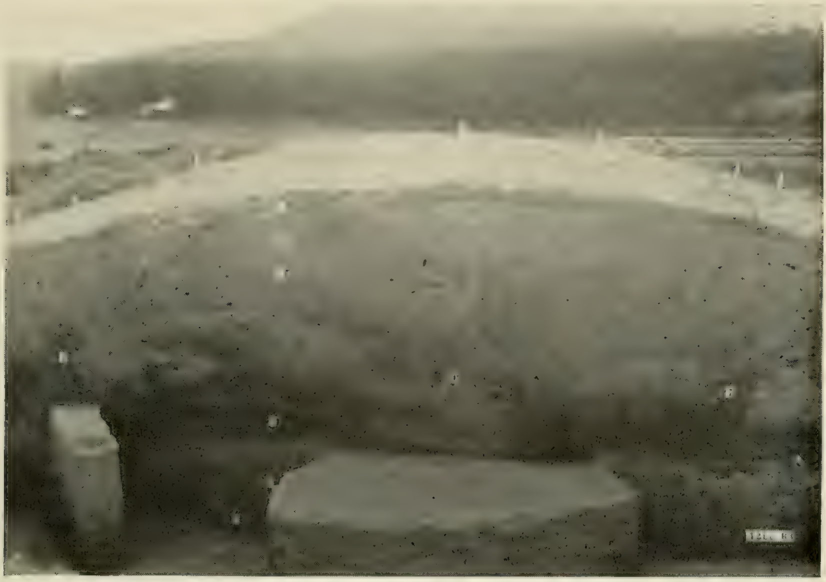


Natural Zones of Alternate Shell and River Deposit. Site Lu^{v} 62.

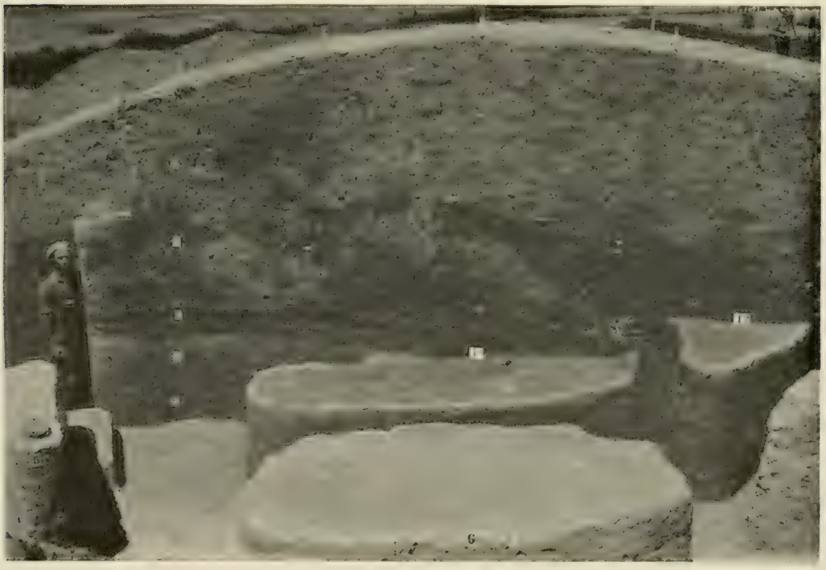
1. VIEW OF MOUND FROM SOUTHWEST, SHOWING START OF TRENCHES. SITE Lu°63.



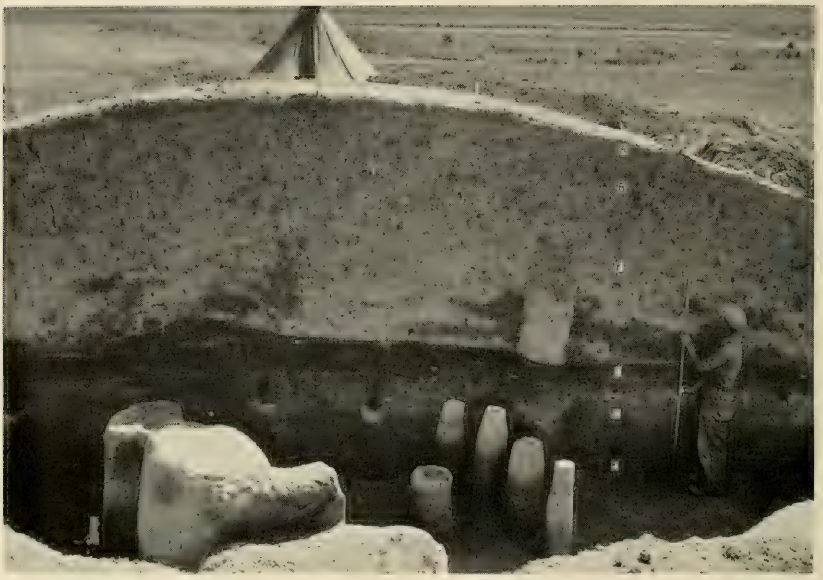
2. THE 15-FOOT PROFILE, SHOWING SIX ZONES MARKED BY STRINGS. SITE Lu°63.



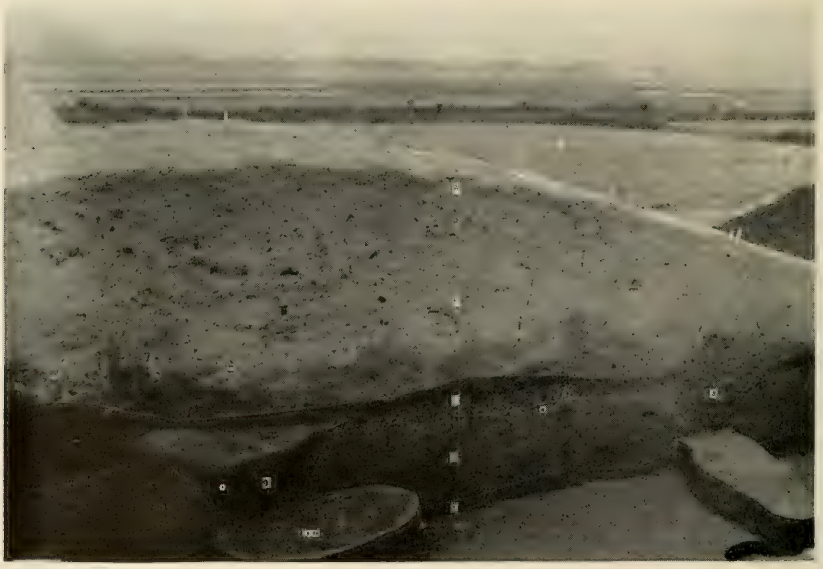
1. THE 20-FOOT PROFILE, SHOWING PITS 5, 6, AND 7, LOOKING NORTH. SITE LU° 63.



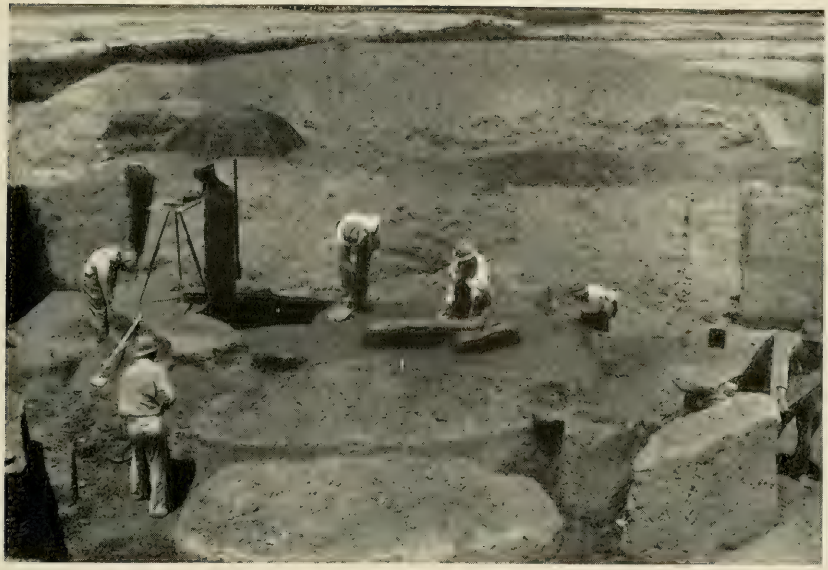
2. THE 25-FOOT PROFILE, SHOWING PITS 5, 6, 11, AND 12, LOOKING NORTH. SITE LU° 63.



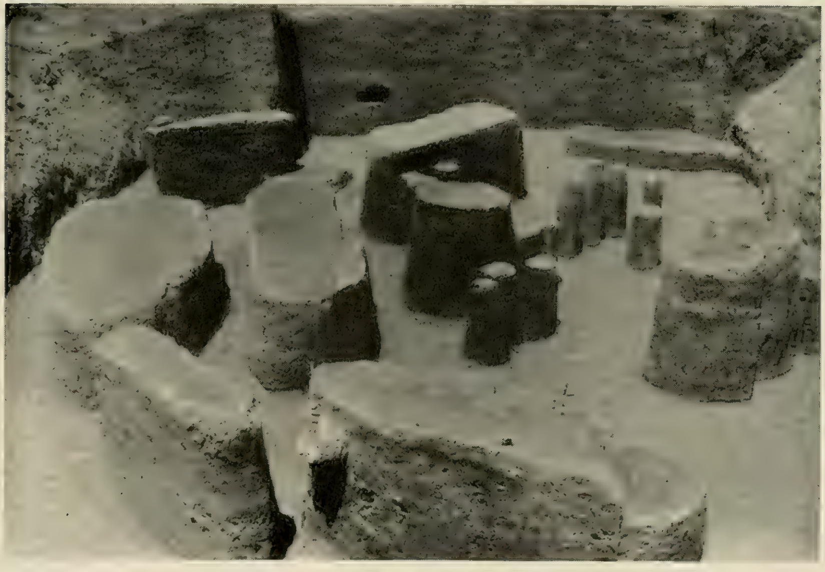
1. THE 30-FOOT PROFILE, SHOWING PITS 9, 10, AND POST HOLES. LOOKING SOUTH. SITE LU° 63.



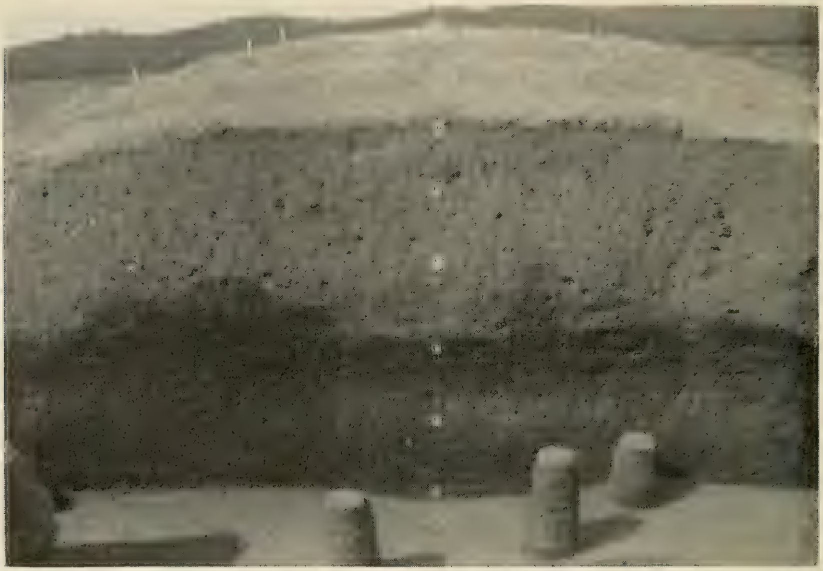
2. THE 35-FOOT PROFILE, SHOWING PITS 8, 9, AND 10, LOOKING SOUTHWEST. SITE LU° 63.



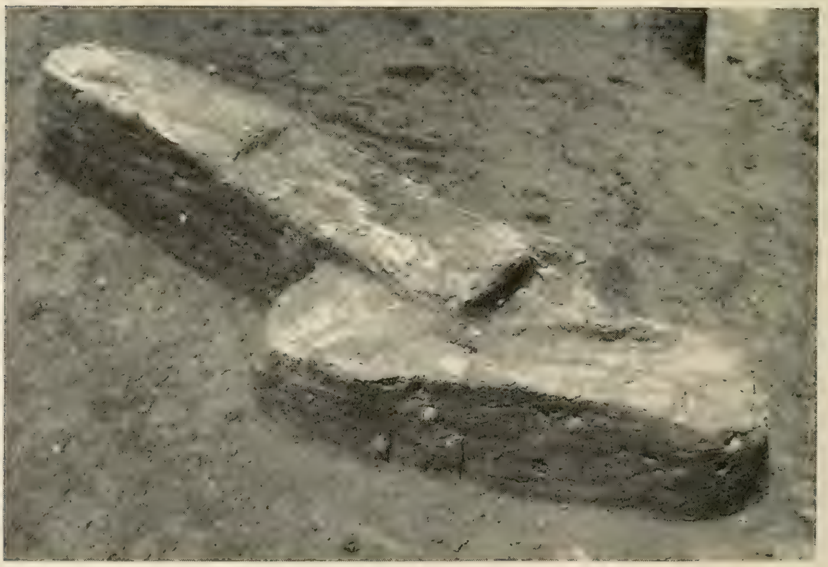
1. EXCAVATING AROUND PITS, LOOKING NORTH. SITE LU° 63.



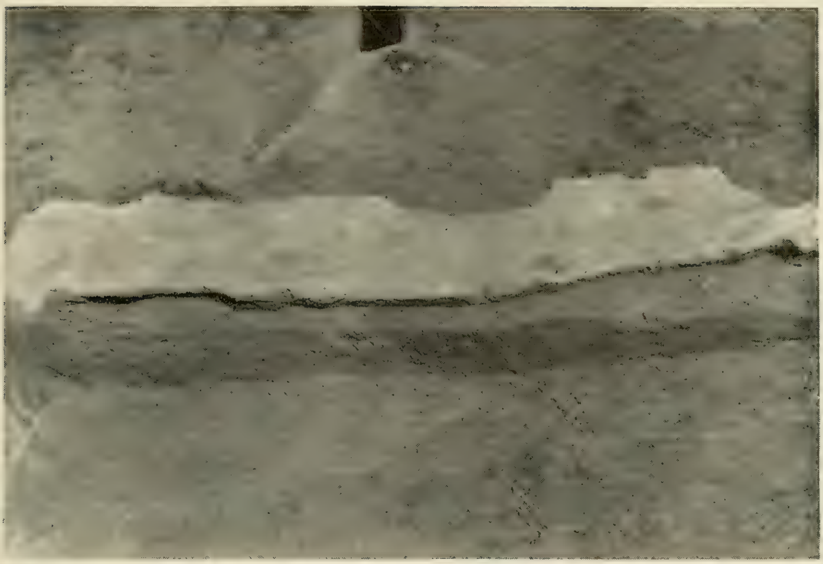
2. BASE OF MOUND, LOOKING EAST, PITS EXCAVATED IN RELIEF. SITE LU° 63.



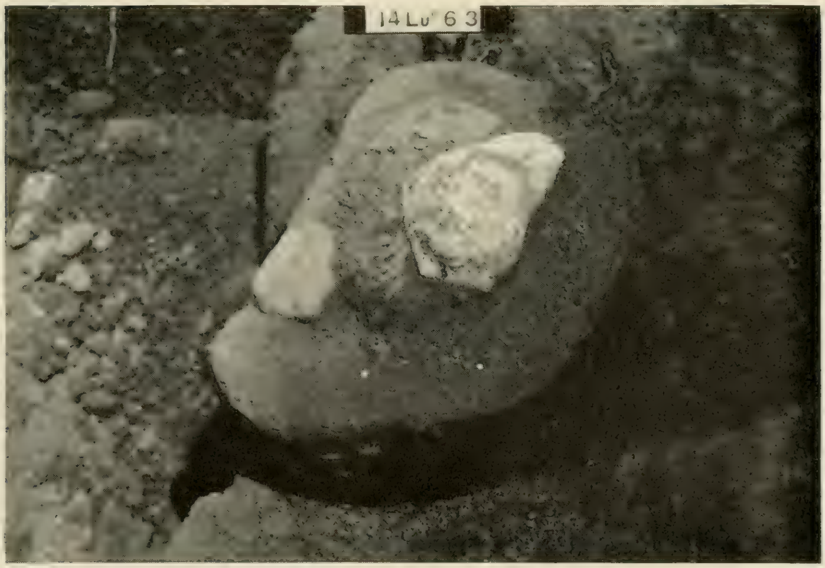
1. THE 40-FOOT PROFILE, SHOWING ZONES MARKED BY STRINGS, LOOKING SOUTH. SITE LU° 63.



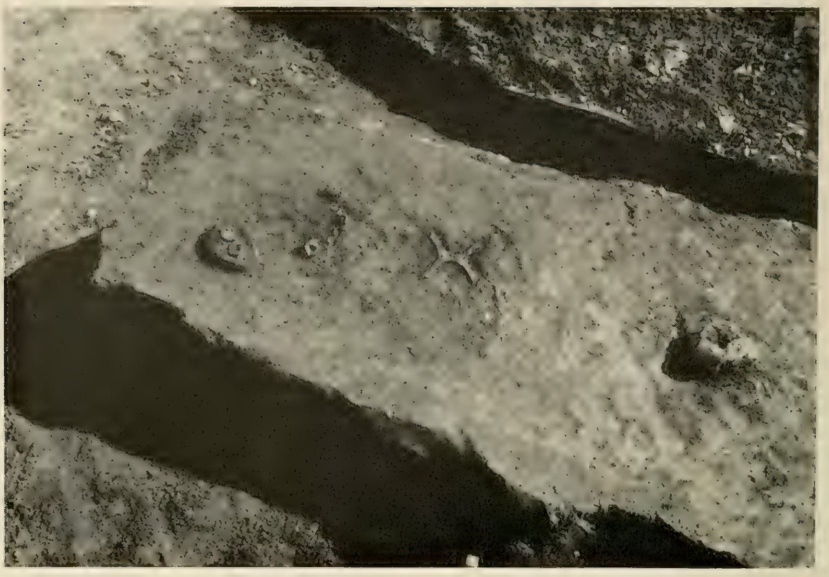
2. FEATURE 4, LOG OF WOOD PARTIALLY "PETRIFIED." SITE LU° 63.



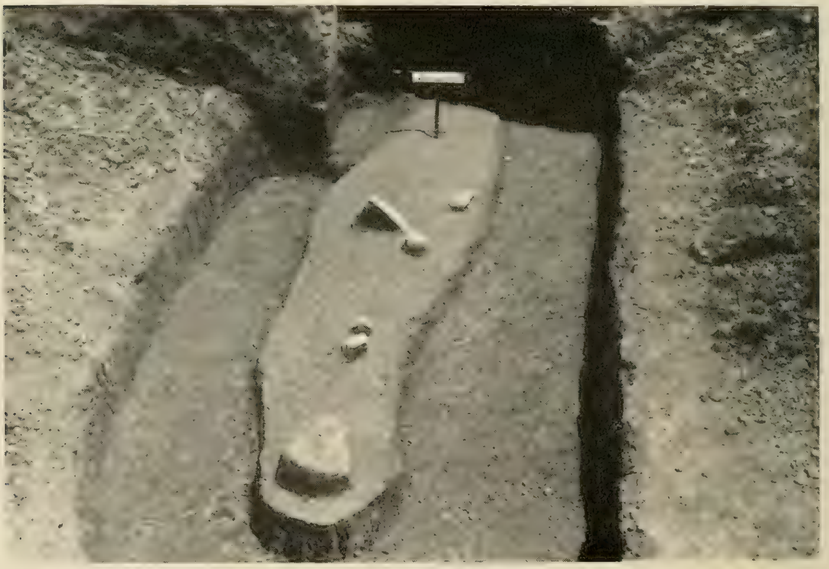
1. BURIAL PIT LINED WITH BLUE CLAY. SITE LU° 63.



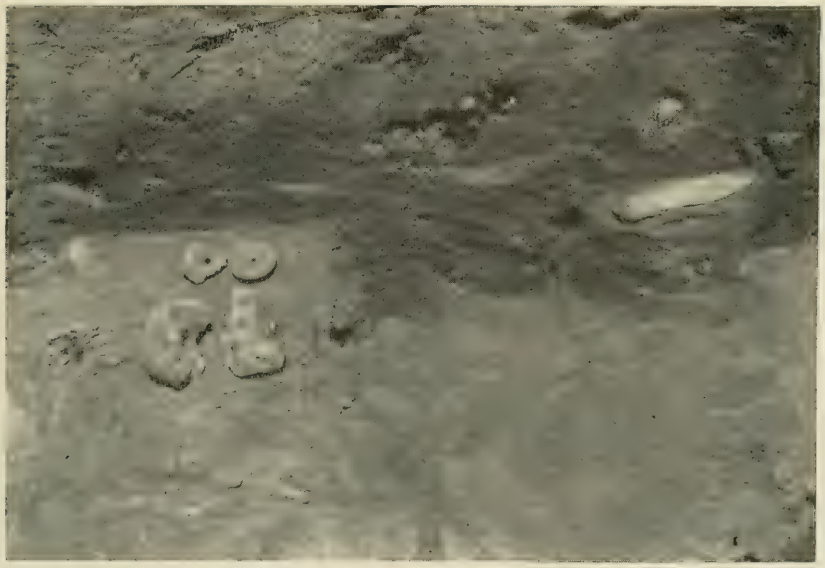
2. BURIAL NO. 4. INFANT. WITH CONCH SHELL AND GALENA. SITE LU° 63



1. Burial No. 10, Showing Teeth, Galena, Copper Ear Spools, and Reel. Site Lu° 63.

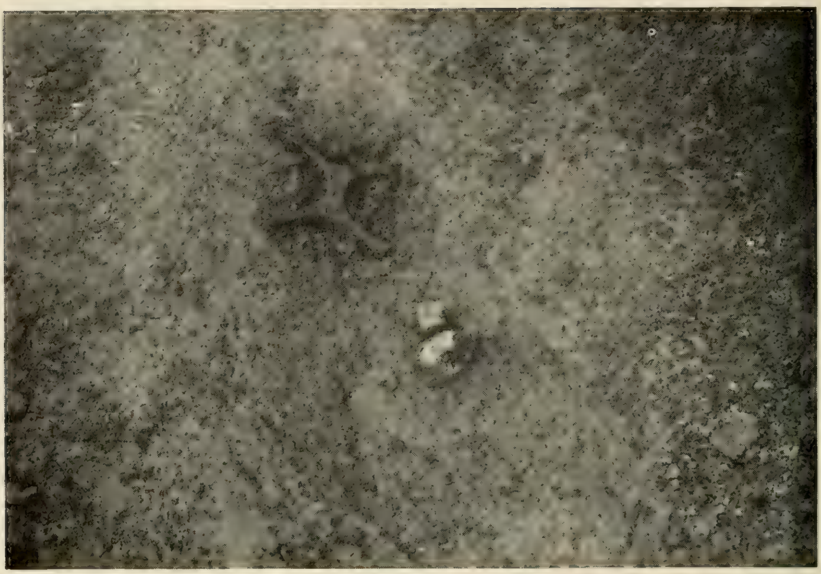


2. Burial No. 13, Showing Grneenstone Celt. Site Lu° 63.

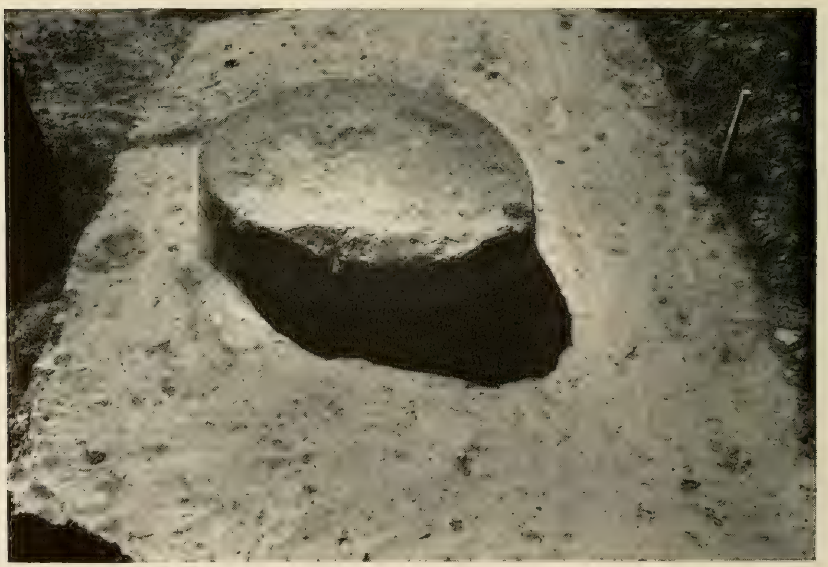


1. BURIAL NO. 1, SHOWING GALENA, COPPER SPOOLS, AND FLINT KNIFE. SITE Lu° 63.

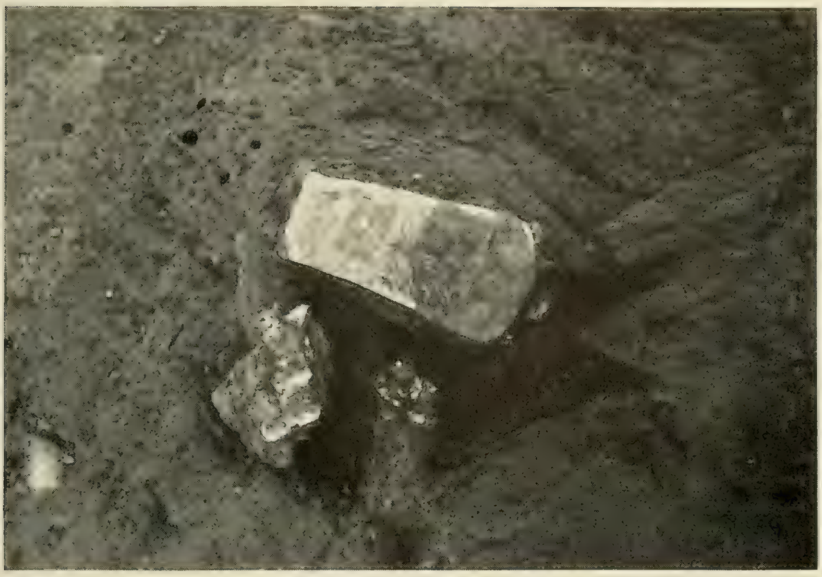
2. THIN SHEET OF COPPER ("BREASTPLATE"), TEXTILE PRESERVED ON BOTH SIDES. SITE Lu° 63.



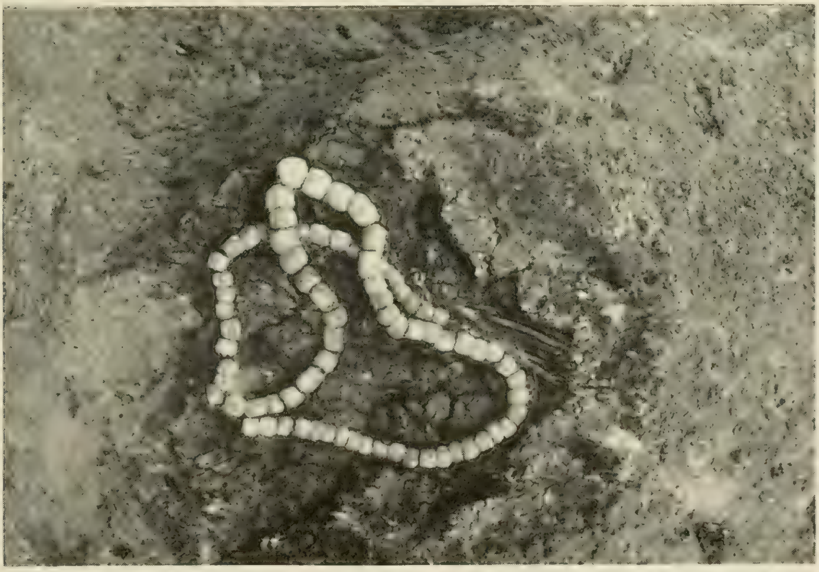
1. BURIAL NO. 16. BURIAL INFERRED BY PRESENCE OF COPPER REEL AND TWO CHUNKS OF GALENA. SITE LU° 63.



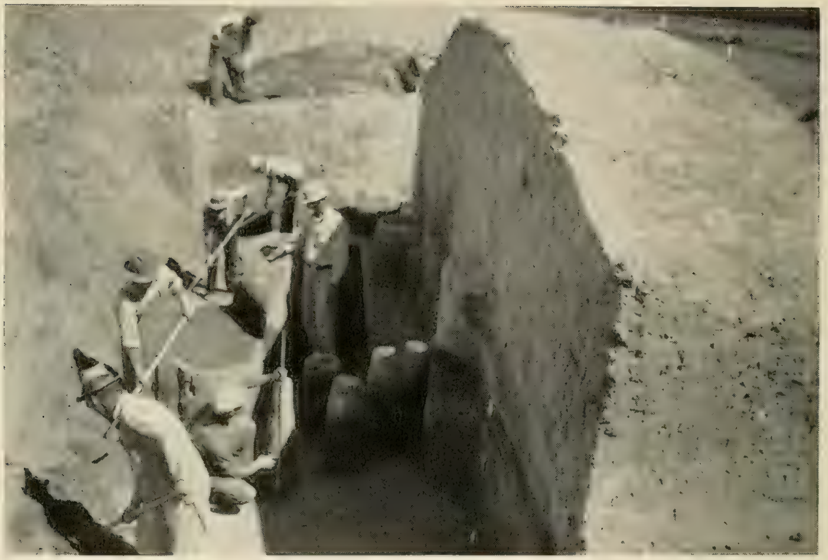
2. CIRCULAR FIRE PIT FILLED WITH ASHES, CHARCOAL, AND BURNED CLAY. PIT EXCAVATED IN RELIEF. SITE LU° 63.



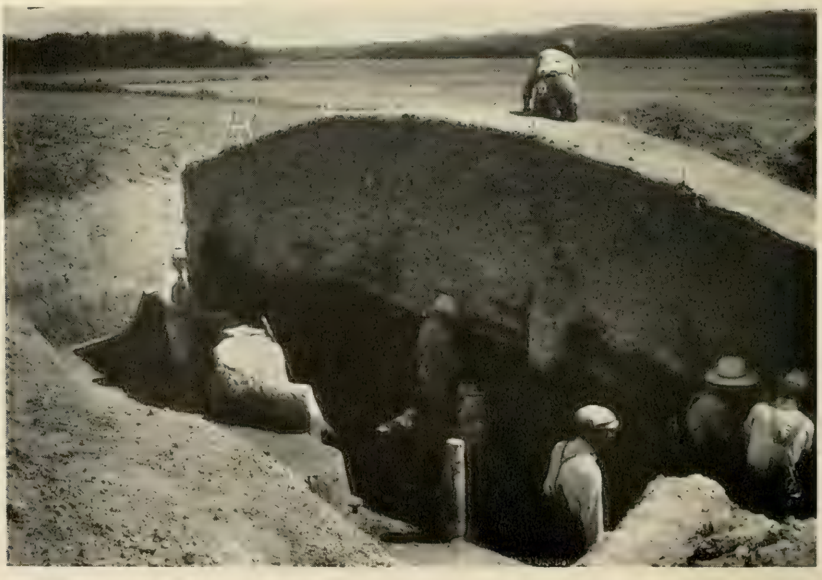
1. COPPER CELT IN SITU, SHOWING PRESERVED TEXTILE ABOVE AND BELOW. SITE LU° 63.



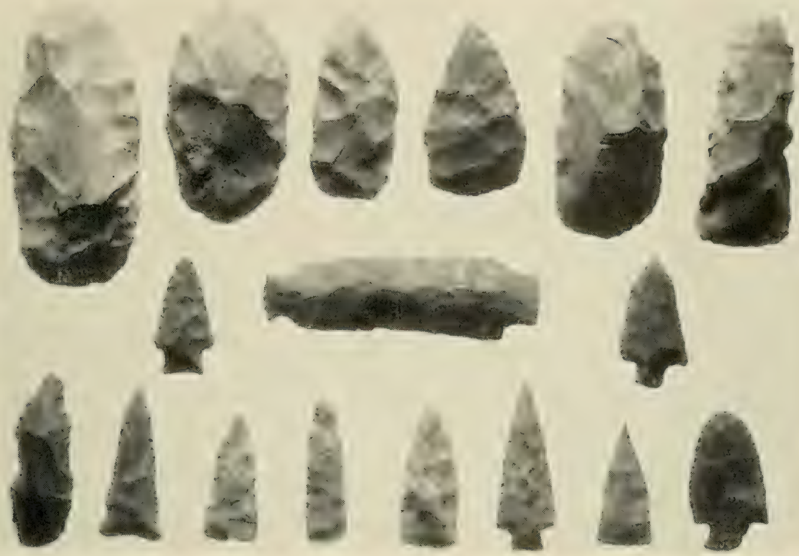
2. BURIAL NO. 8, PROBABLY A CREMATION. CIRCULAR AREA COVERED BY CHARCOAL AND BONE FRAGMENTS WITH STRING OF COPPER BEADS. SITE LU° 63.



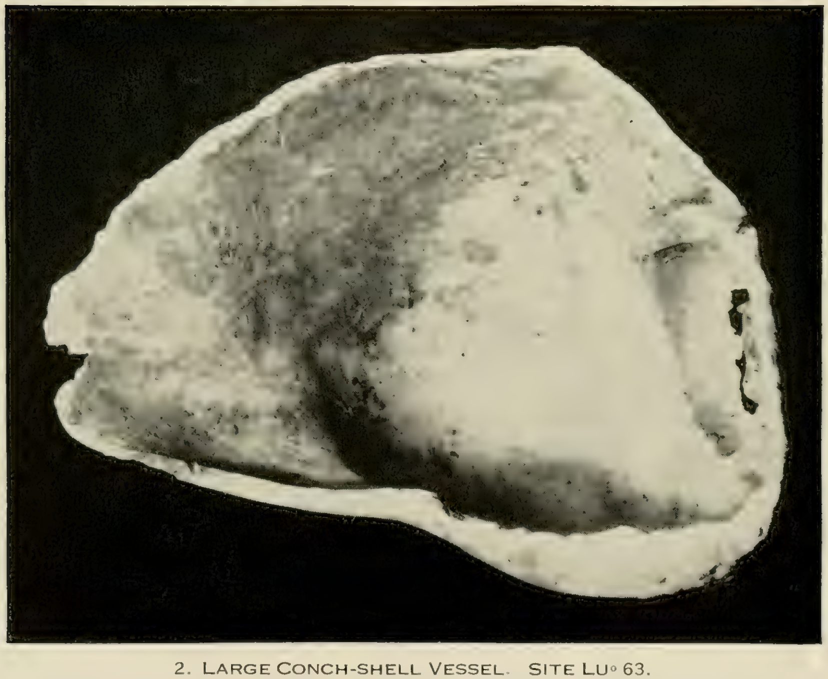
1. Cleaning Floor Between 40-Foot and 30-Foot Profile. Site Lu° 63.



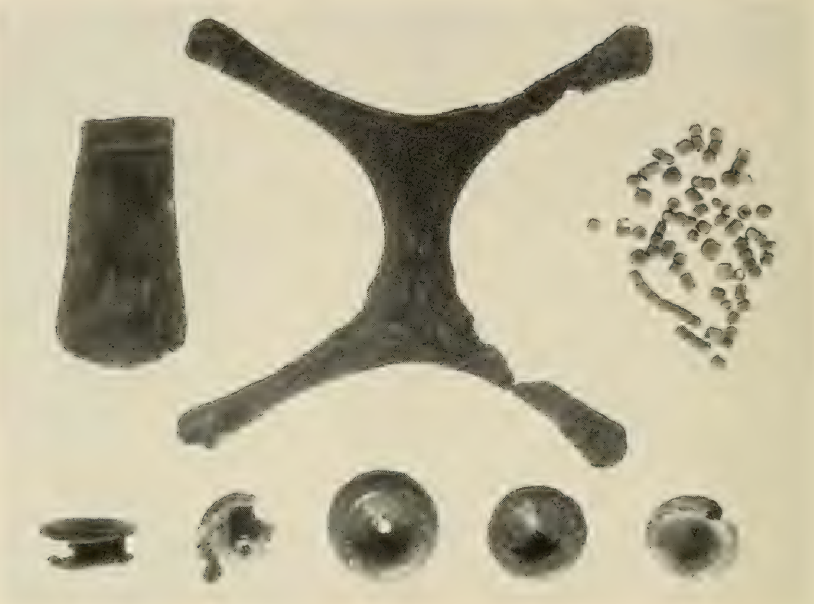
2. Sketching in Zones on 30-Foot Profile. Site Lu° 63.



1. FLINT ARTIFACTS FROM GENERAL DIGGING. SITE LU° 63.

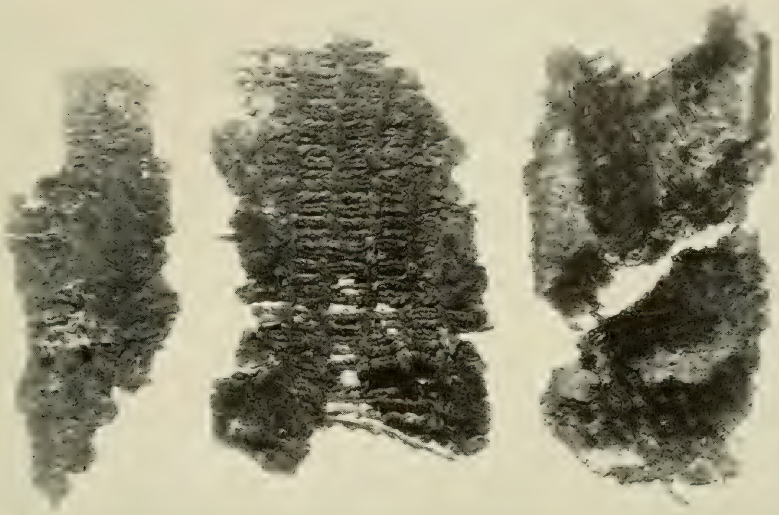


2. LARGE CONCH-SHELL VESSEL. SITE LU° 63.

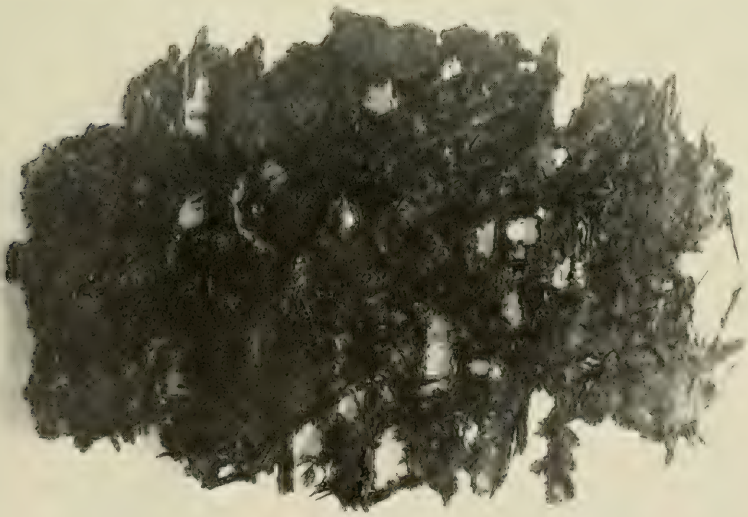


1. COPPER ARTIFACTS. SITE Lu° 63.

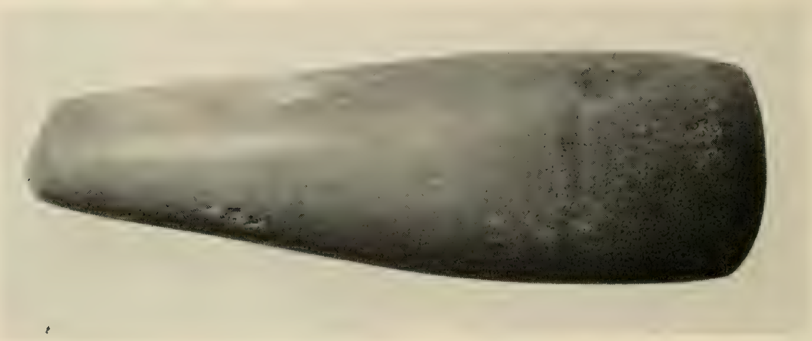
2. COPPER PLATE PARTIALLY COVERED BY PRESERVED LEATHER. SITE Lu° 63.



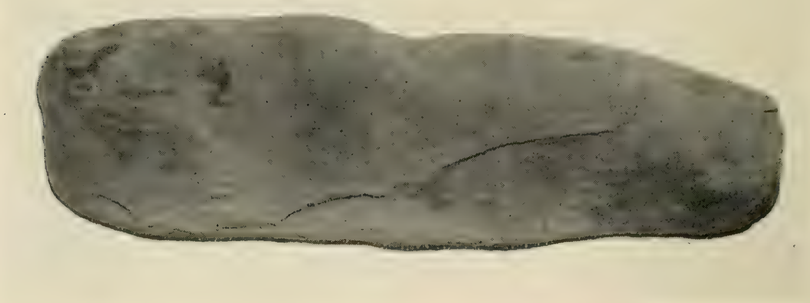
1. REMNANT OF COPPER PLATE, TEXTILE PRESERVED BY IT, AND MATTING COVER. SITE Lu° 63.



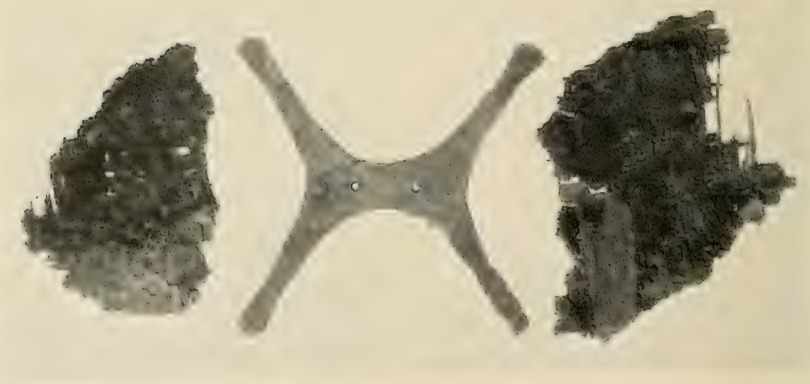
2. MATTING PRESERVED BY COPPER PLATE. SITE Lu° 63.



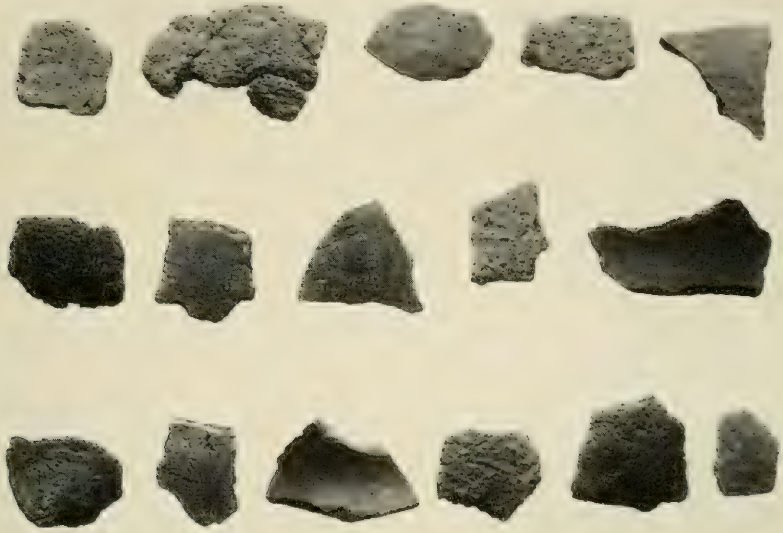
1. Greenstone Celt. Site Lu° 63.



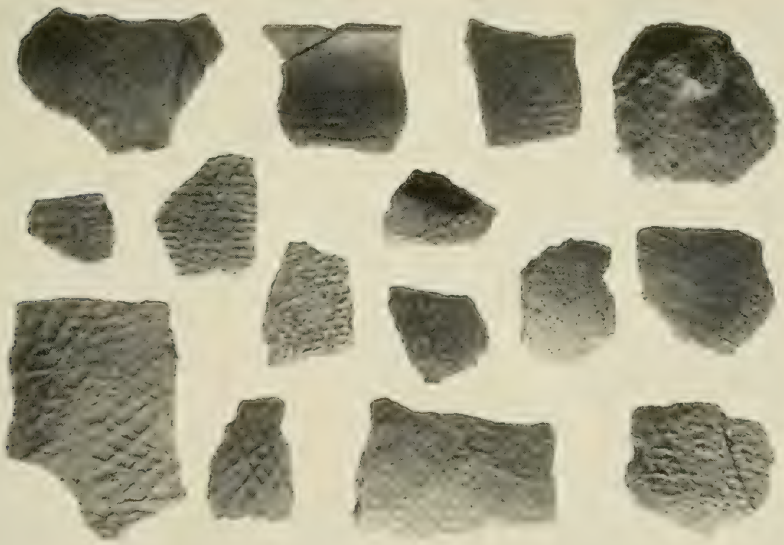
2. Greenstone Spade. Site Lu° 63.



3. Small Copper Reel and Matting. Site Lu° 63.

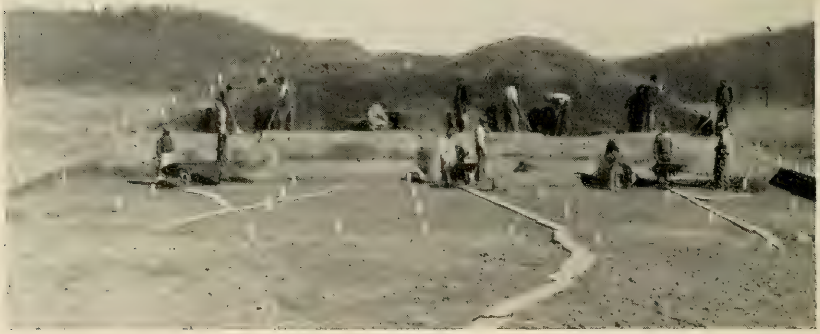


1. PLAIN SURFACE SHERDS, TYPE 3A. SITE LU° 63.

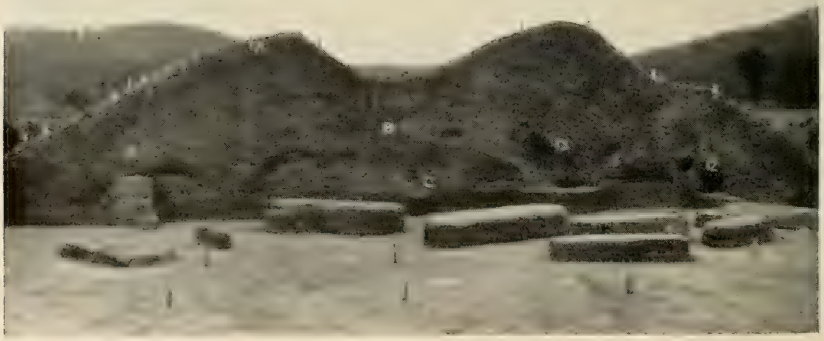


2. STAMPED DECORATED SHERDS, TYPE 3D. SITE LU° 63.

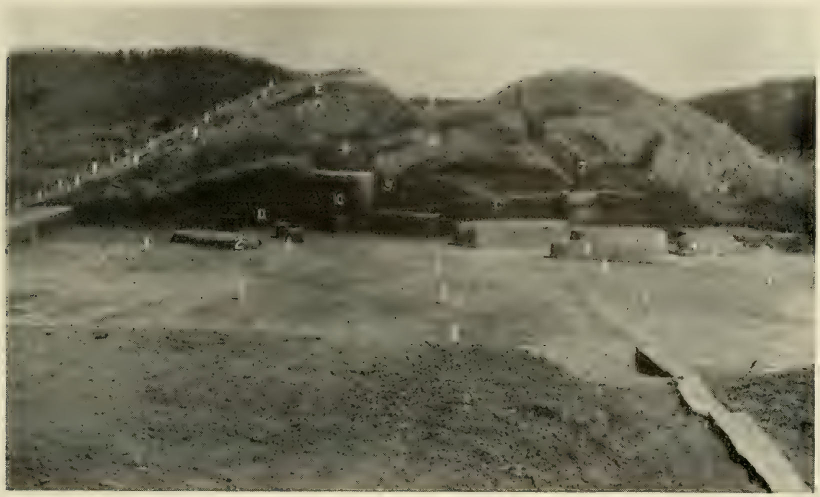
1. View of Mound From Southeast Looking Away From River. Distant Hills Mark Basin Edge. Site Lu° 64.



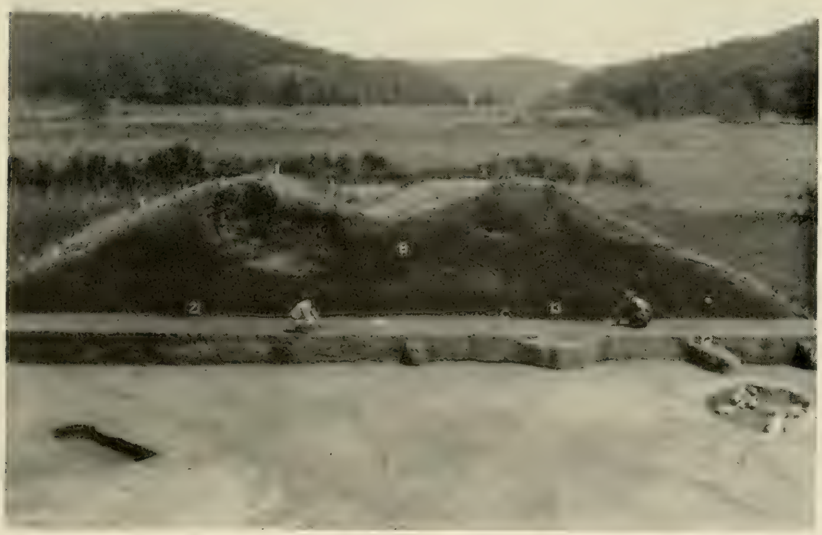
2. Taking Down the 40-Foot Cut. Site Lu° 64.



3. The 50-Foot Profile and Subfloor Pits. Site Lu° 64.



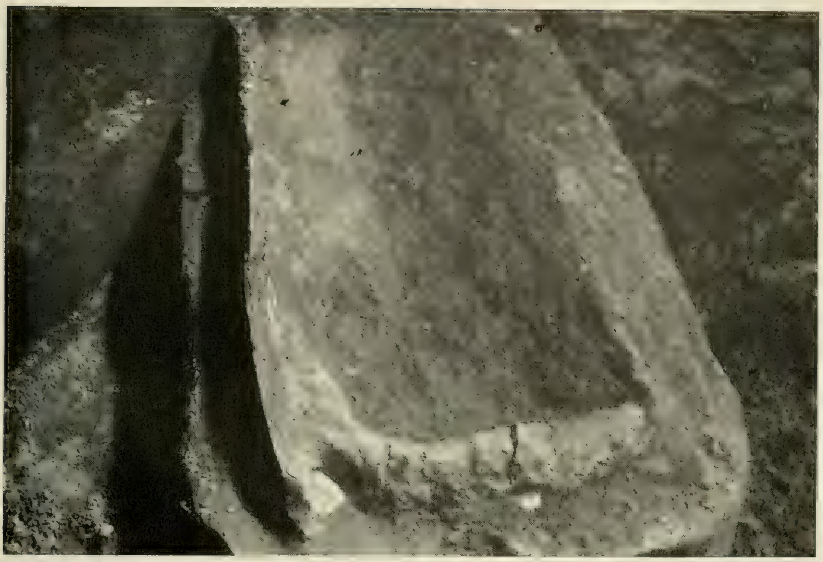
1. THE 45-FOOT PROFILE AND SUBFLOOR PITS. CONTOUR SHOWS SECTION OF TRENCH MADE BY RELIC HUNTERS. SITE Lu° 64.



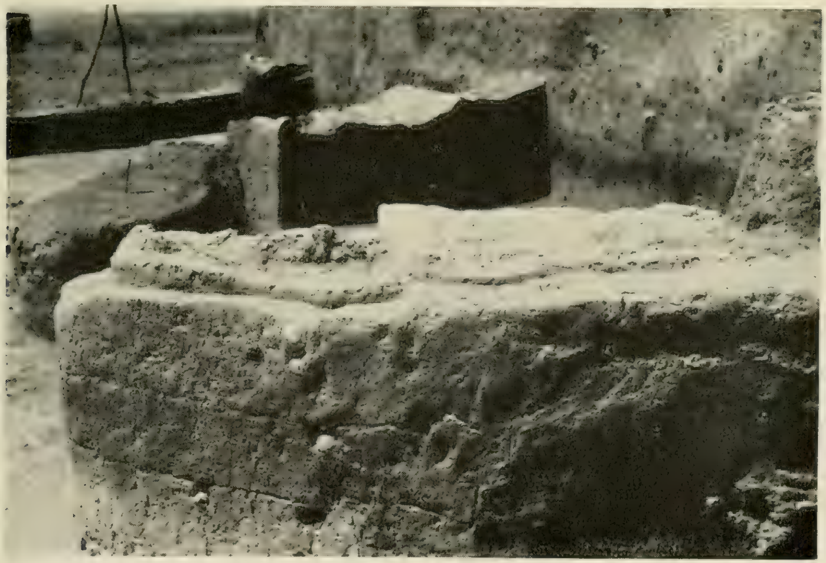
2. THE 55-FOOT PROFILE FROM THE SOUTH. SITE Lu° 64.

1. BURIAL NO. 2, SHOWING TYPICAL CONDITION OF SKELETONS. SITE LU° 64.

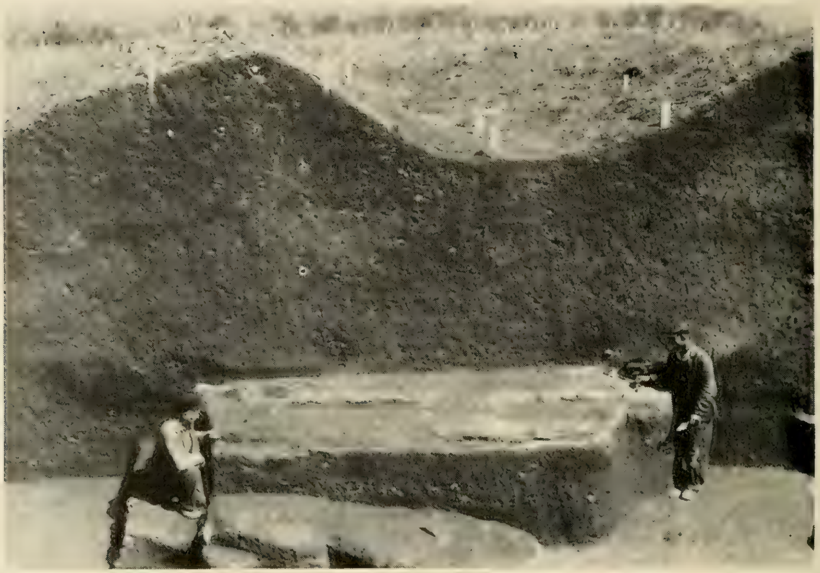
2. PIT NO. 3 IN 40-FOOT PROFILE, SHOWING METHOD OF EXCAVATING ABOUT PIT BEFORE OPENING IT. SITE LU° 64.



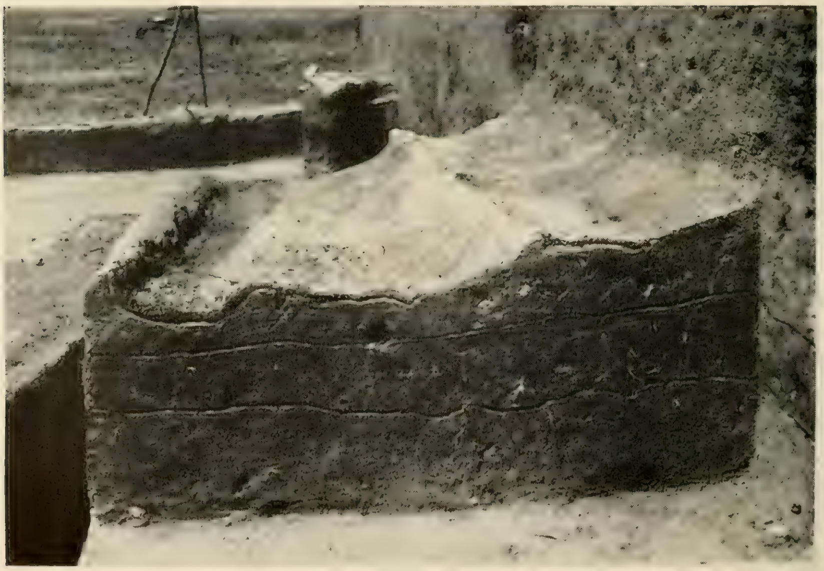
1. FEATURE NO. 2; HOLLOW LOG CLOSED WITH CLAY AT ONE END. SITE LU° 64.



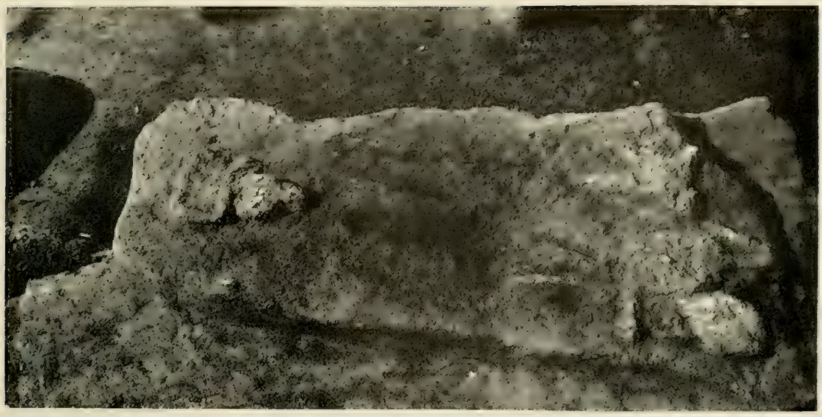
2. BURIAL NO. 14, PIT NO. 7, 45-FOOT PROFILE. SITE LU° 64.



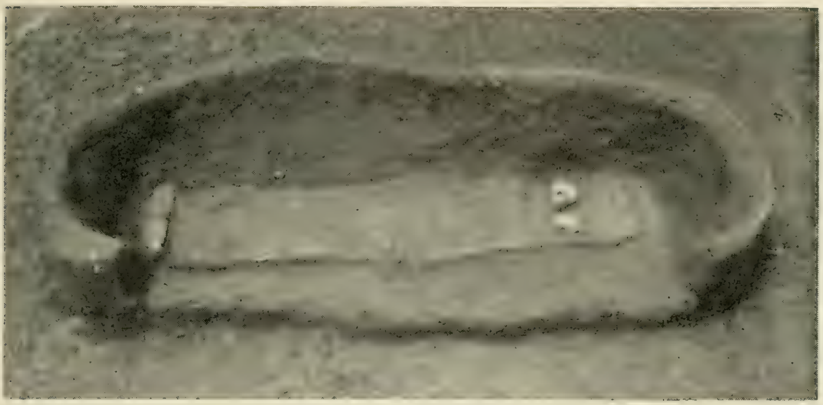
1. FEATURE NO. 5, SIDE VIEW. SITE Luº 64.



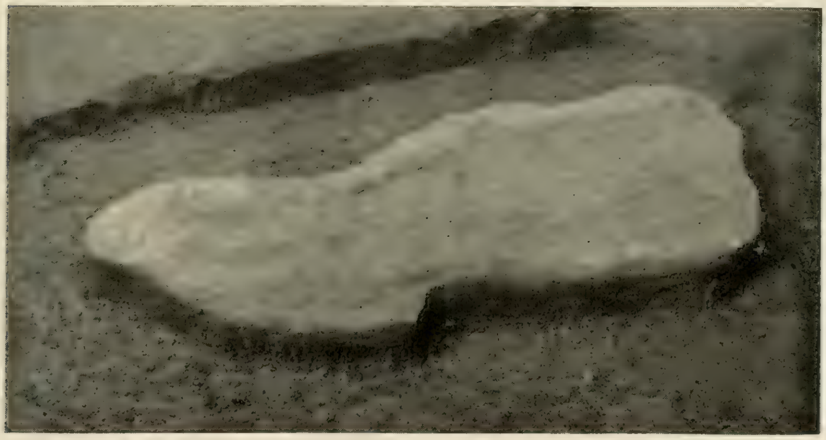
2. FEATURE NO. 5, END VIEW. SITE Luº 64.



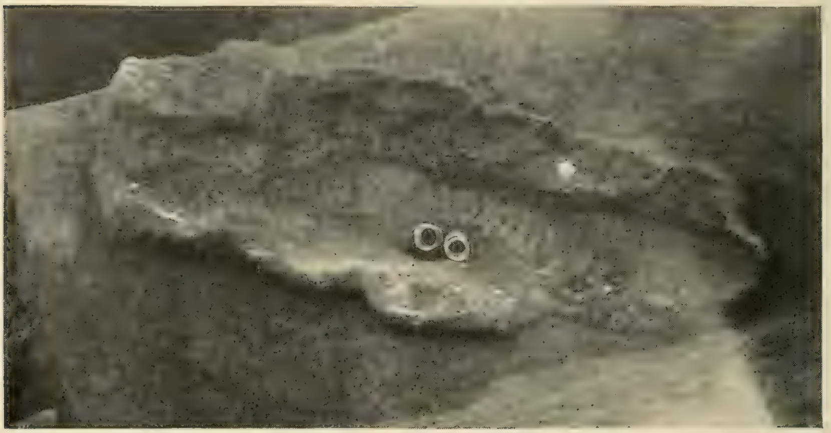
1. Burial No. 13, from North. Site Lu° 64.



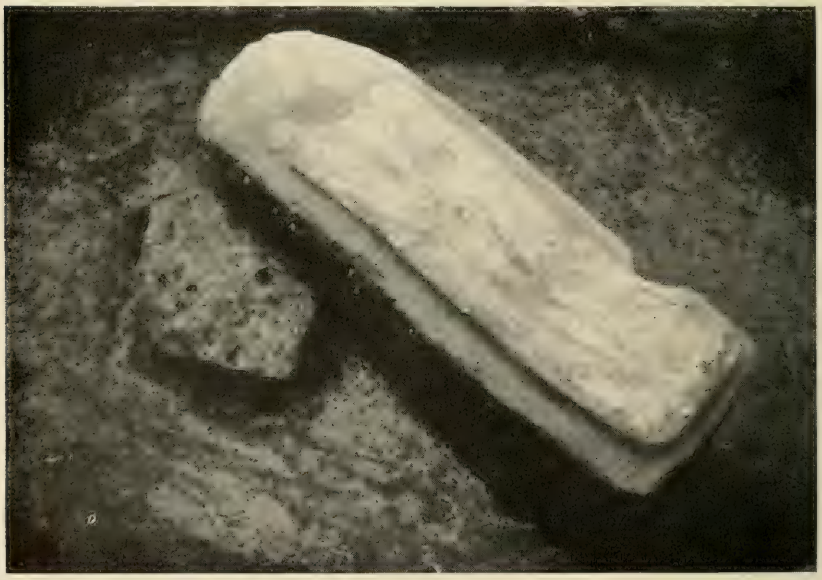
2. Burial No. 15, Pit No. 3. Puddled-clay Cover Removed to Show Three Galena Balls. Site Lu° 64.



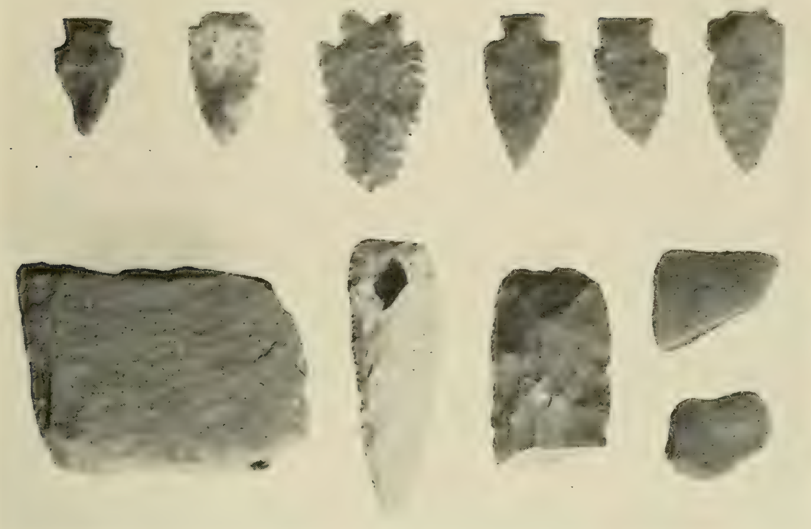
3. Burial No. 26, Showing Puddled-clay Capping. Site Lu° 64.



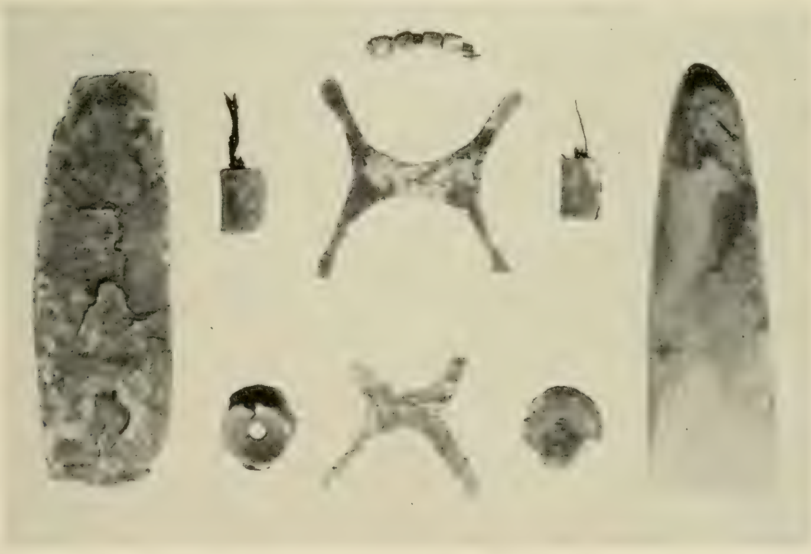
1. BURIAL NO. 37, SHOWING CLAY LINING OF GRAVE AND SIX COPPER BRACELETS. SITE Lu° 64.



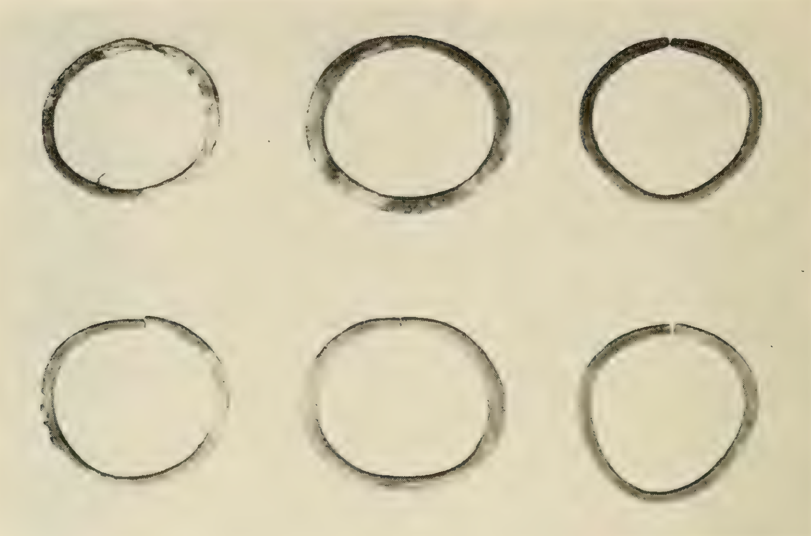
2. BURIAL NO. 25 WITH PUDDLED CLAY COVERING, SHOWING FORM OF BODY UNDER CLAY. SITE Lu° 64.



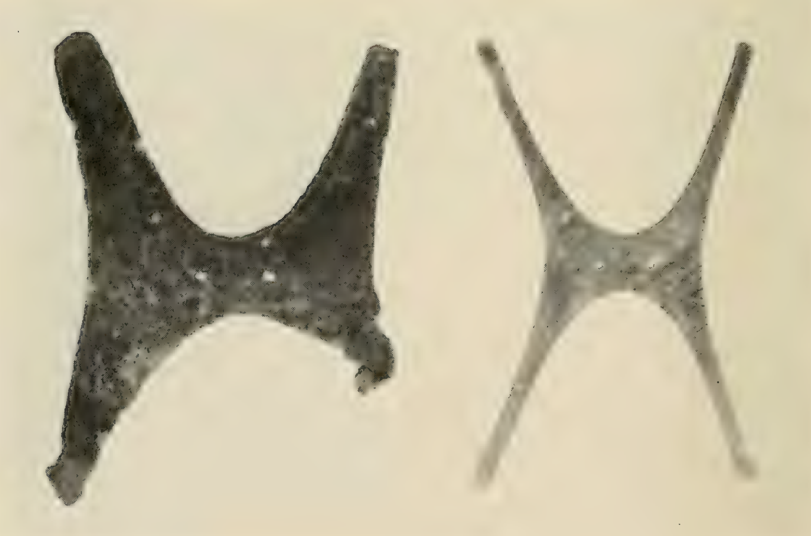
1. CHIPPED-STONE ARTIFACTS AND TWO POTSHERDS. SITE Lu° 64.



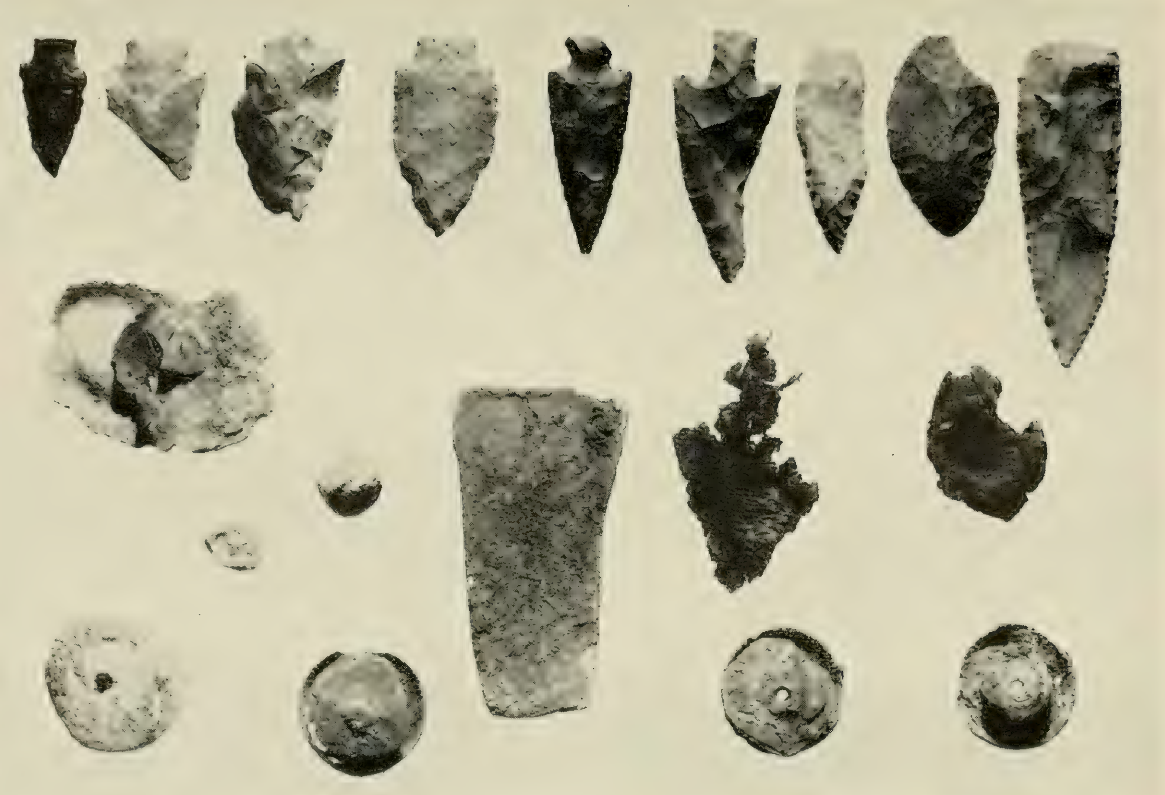
2. COPPER BEADS, REELS, CELT, EAR-SPOOLS, AND STONE CELT. SITE Lu° 64.



1. SIX BRACELETS FROM BURIAL NO. 37. SITE LU° 64.

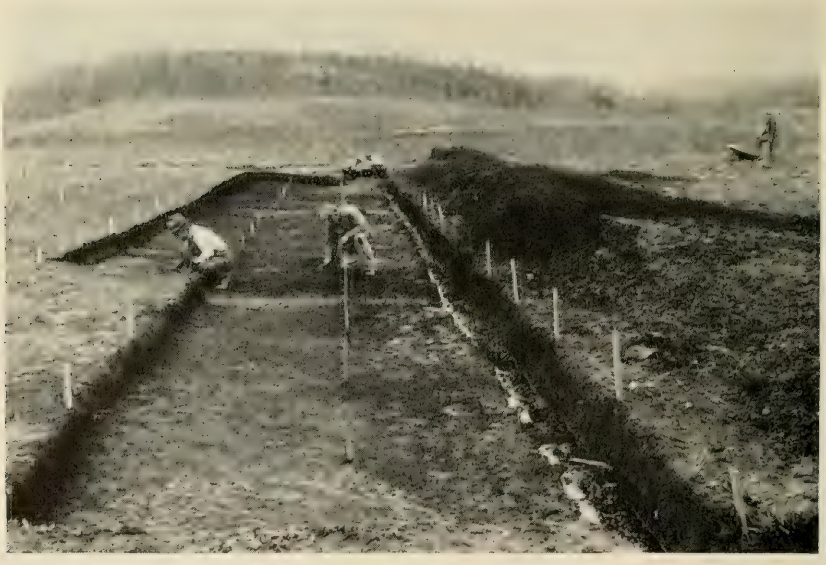


2. TWO LARGE COPPER REELS. SITE LU° 64.

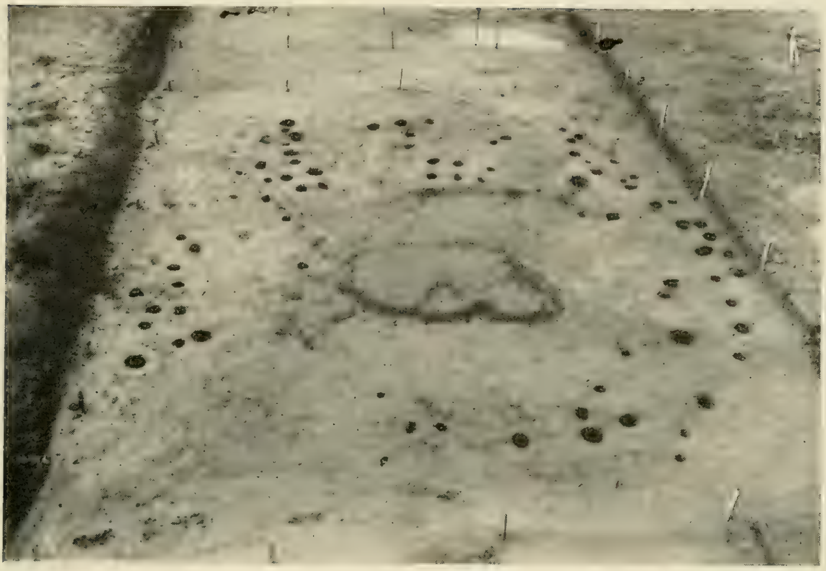


Copper Celt and Ear Ornaments with Preserved Textile, Wood, and Skin Site Lu° 64.

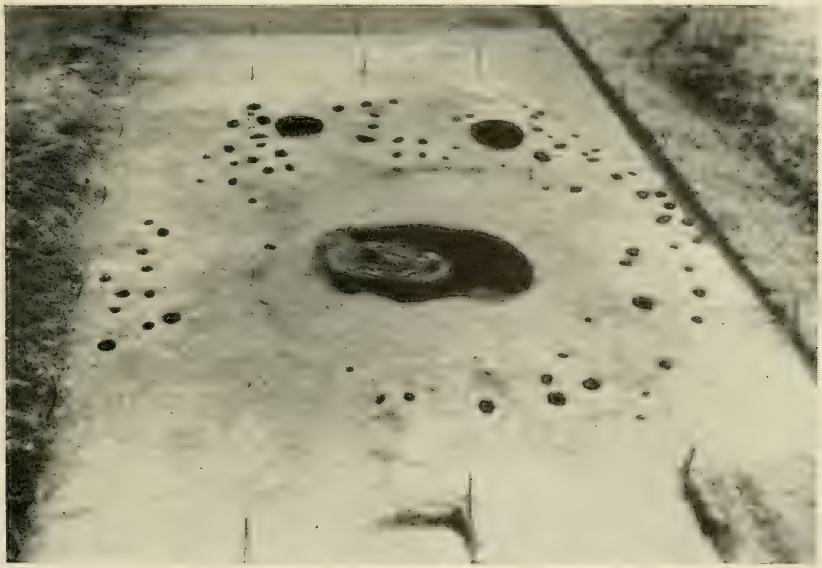
1. View of Site, Showing Staked Area and Site Lu^v 65, an Earth Mound in Right Distance.



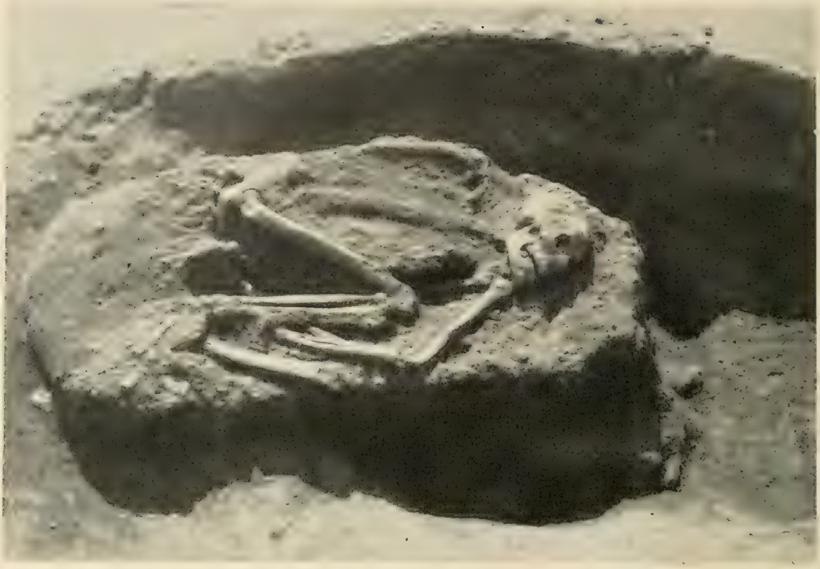
2. Village Midden. Base Line to 15-Foot Profile Looking North. Site Lu^v 65.



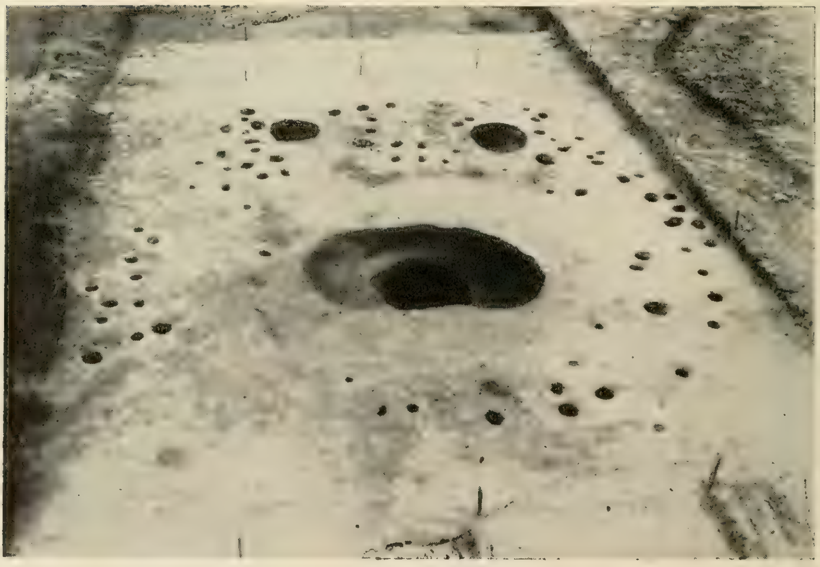
1. Feature No. 2, Midden Area Cut Away Except in Central Pit. Site Lu^v 65.



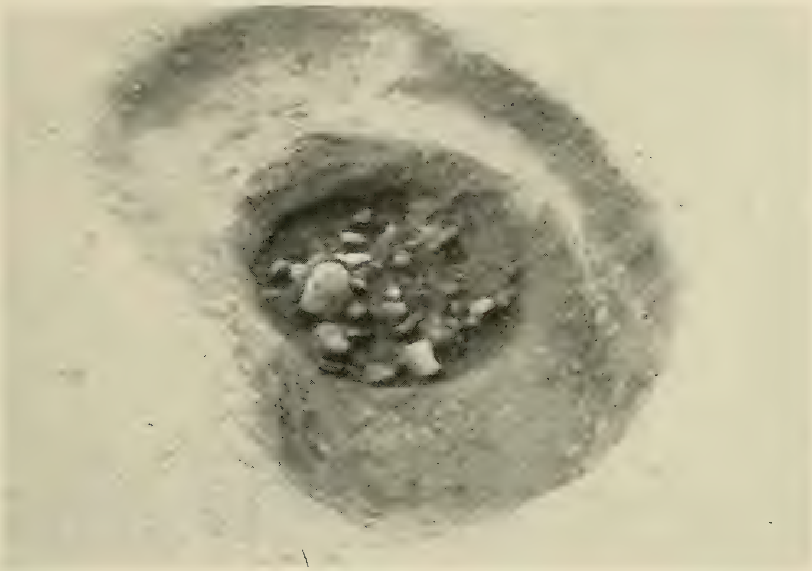
2. Burial No. 1 in Feature No. 2. Site Lu^v 65.



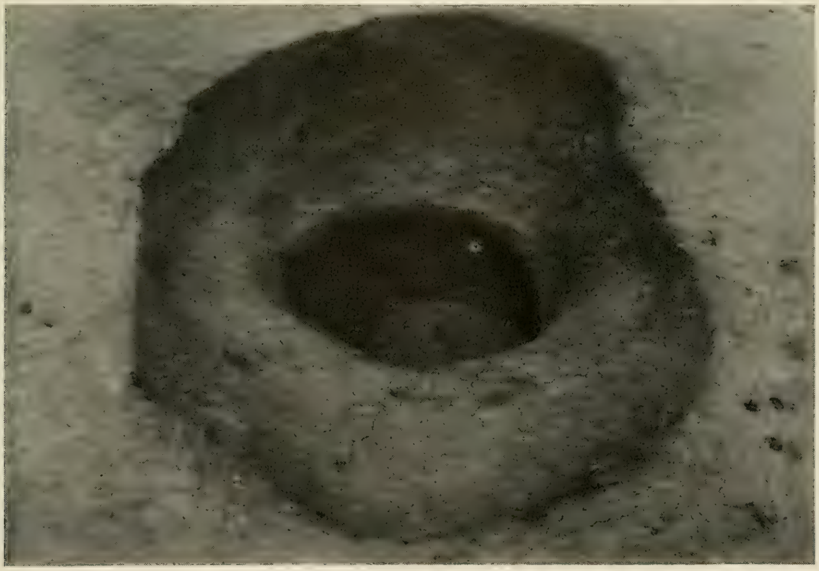
1. BURIAL NO. 1. SITE Lu^v 65.



2. FEATURE NO. 2 WITH FIRE-BASIN. SITE Lu^v 65.

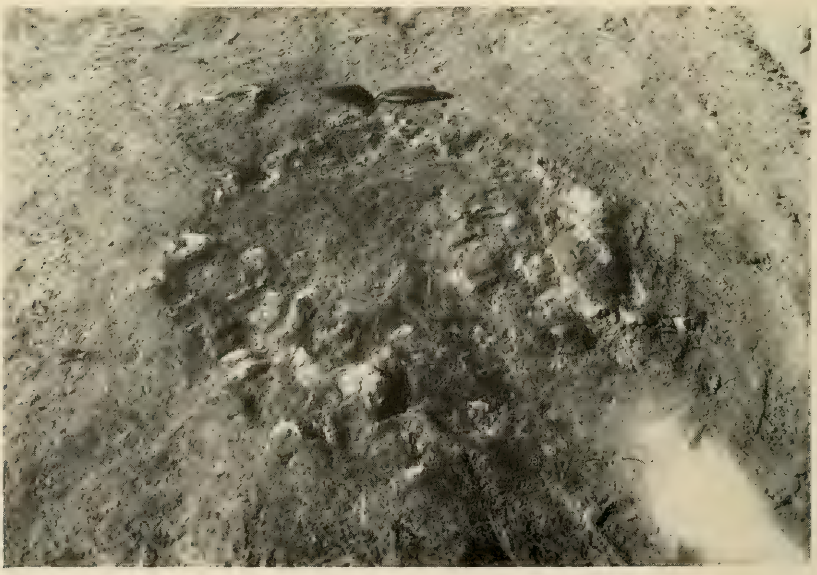


1. Fire-Basin in Middle of Floor of Feature No. 2. Not Completely Excavated. Site Luᵛ 65.

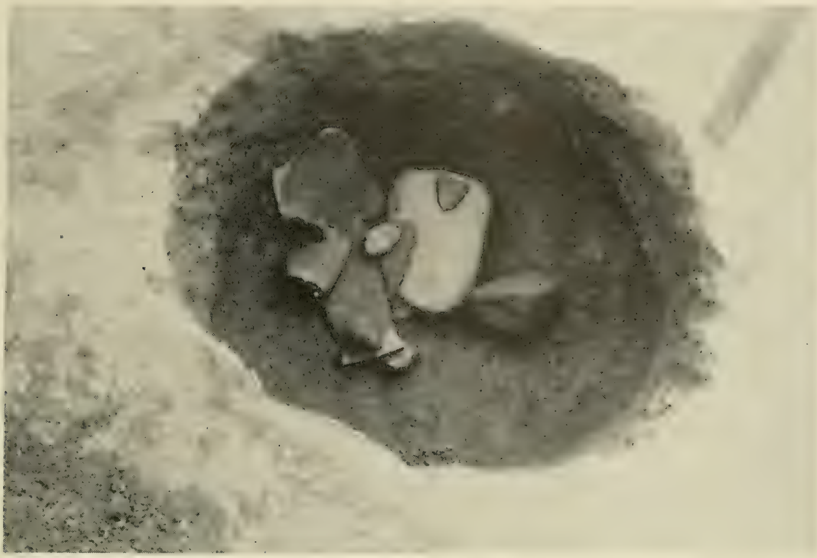


2. Fire-Basin in Feature No. 2. Site Luᵛ 65.

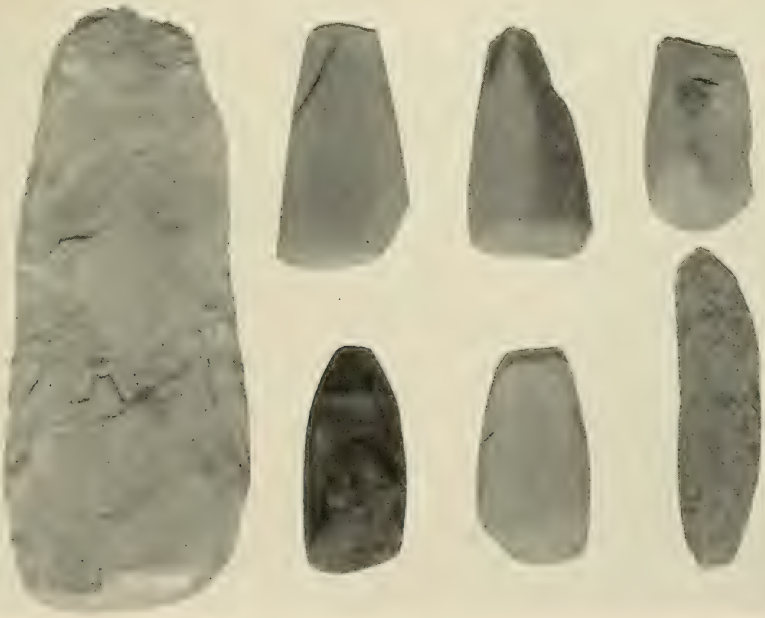
1. PIT NO. 3 (FEATURE NO. 3), SHOWING POTSHERDS. SITE LU^v 65.



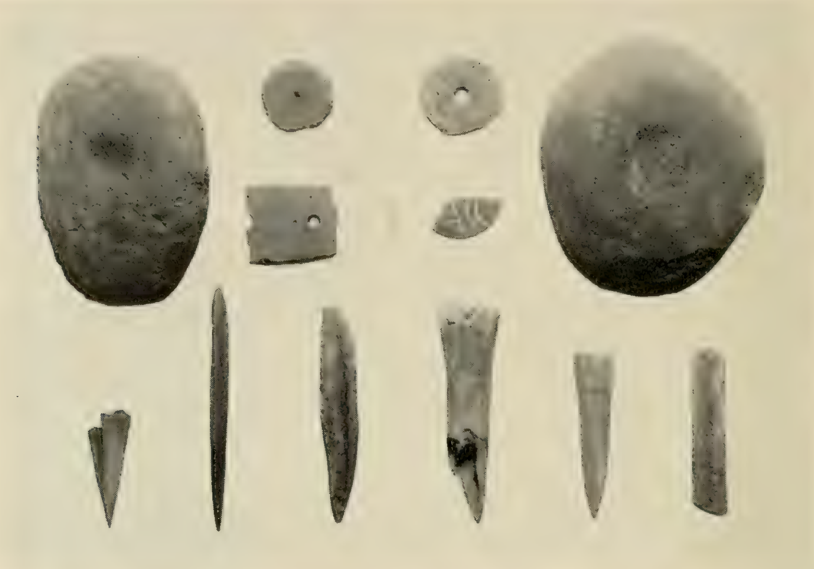
2. PIT NO. 17 BEFORE EXCAVATION. SITE LU^v 65.



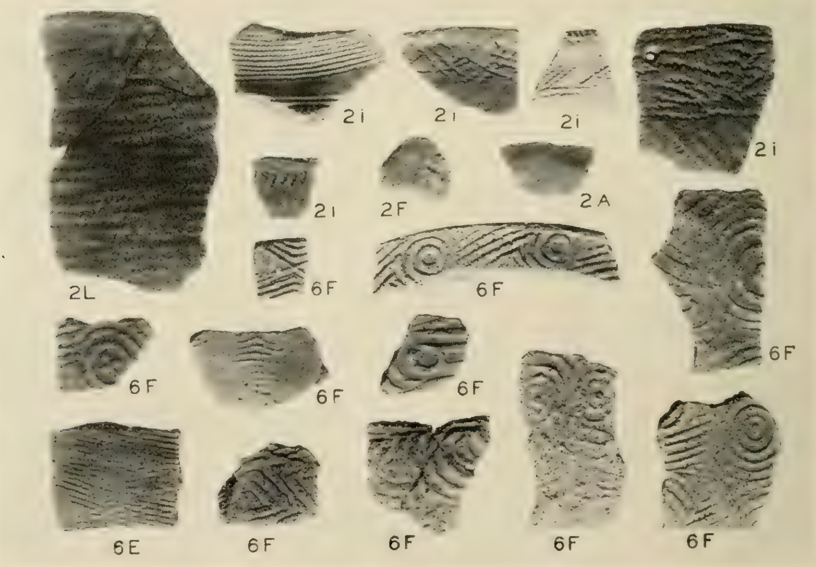
1. PIT NO. 17, SHOWING POTTERY AND LAPSTONES. SITE LU^{v} 65.



2. GREENSTONE SPADE AND CELTS. SITE LU^{v} 65.



1. Hammerstones, Bone Awls, Antler Spear Point, Pottery Disks, and Two-Holed Gorget. Site Lu^{v} 65.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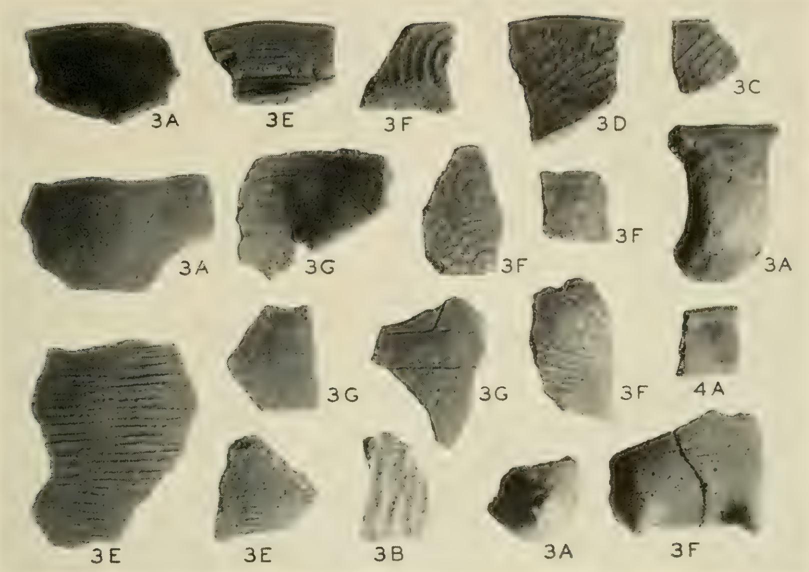
2. Sand-Tempered Ware, Type 2, and Hole-Tempered Ware, Type 6. Site Lu^{v} 65.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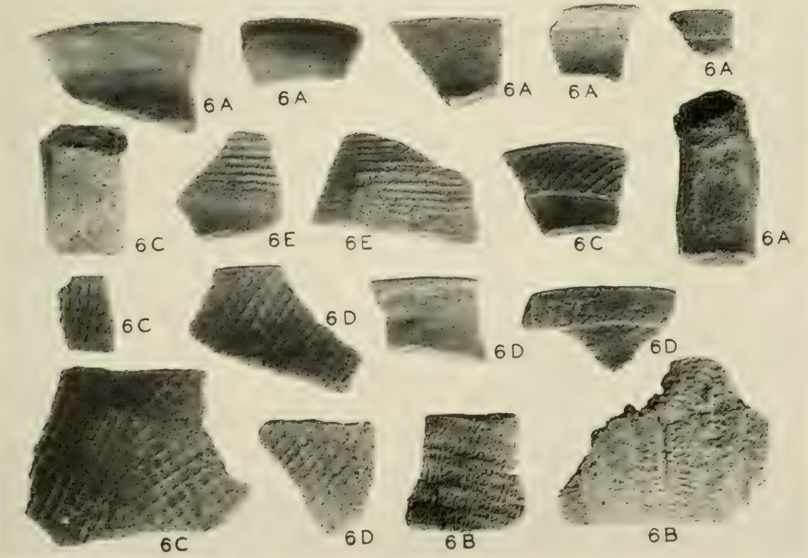
1. CRUSHED-LIMESTONE-TEMPERED WARE, TYPE 3. SITE LU^{v} 65.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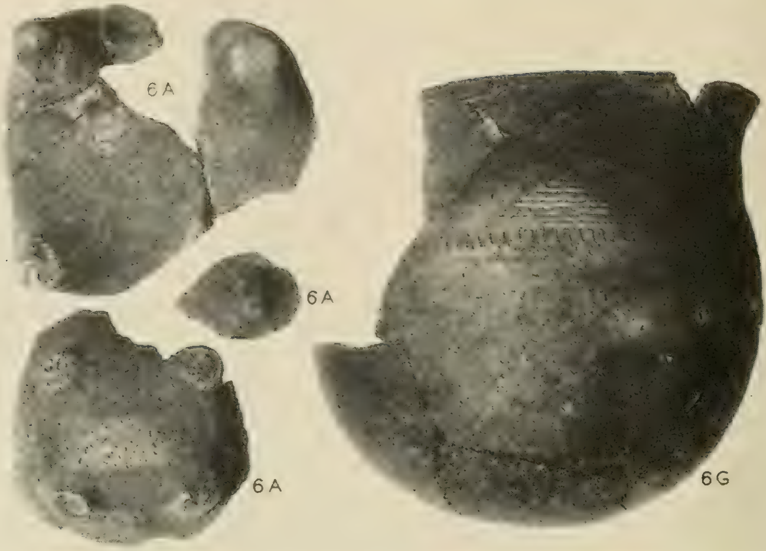
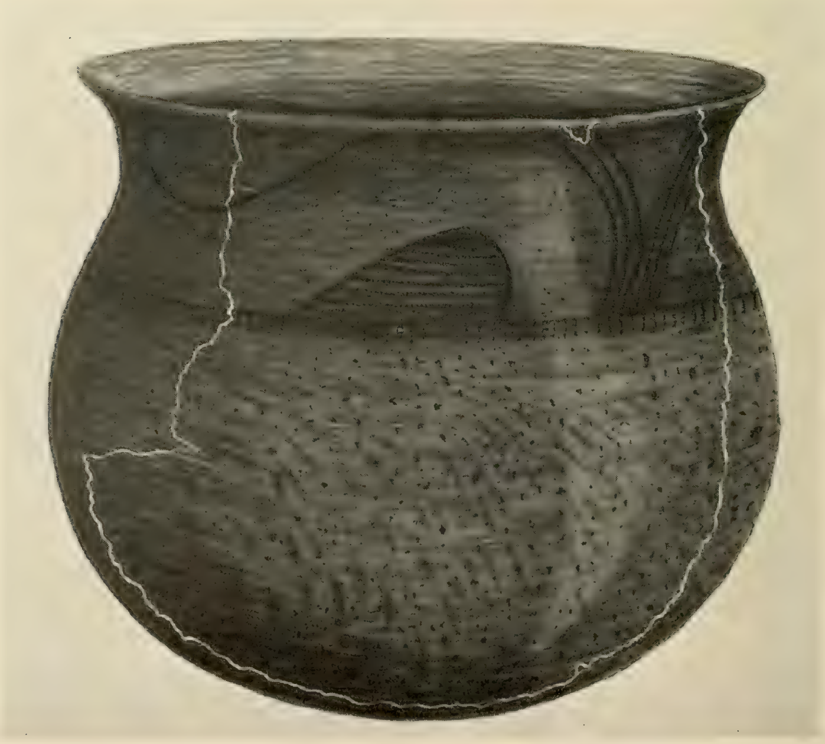
6B

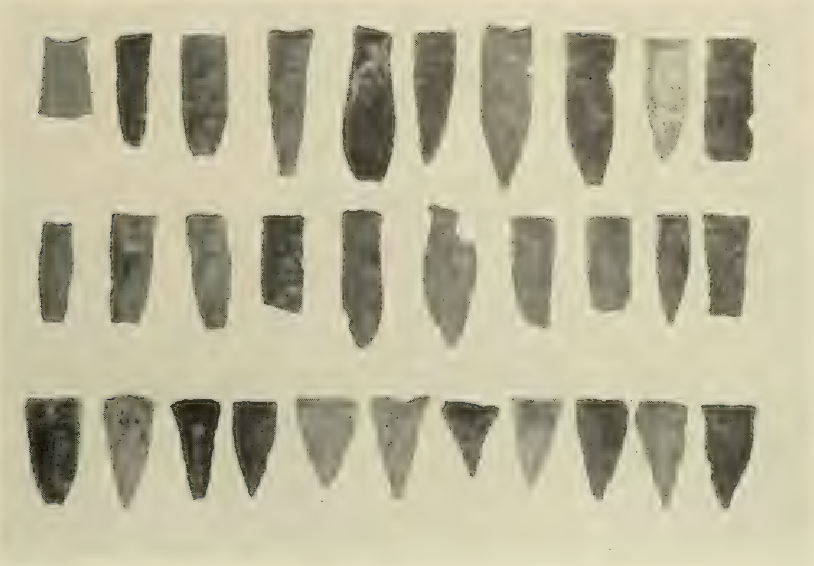
2. HOLE-TEMPERED WARE, TYPE 6. SITE LU^{v} 65.



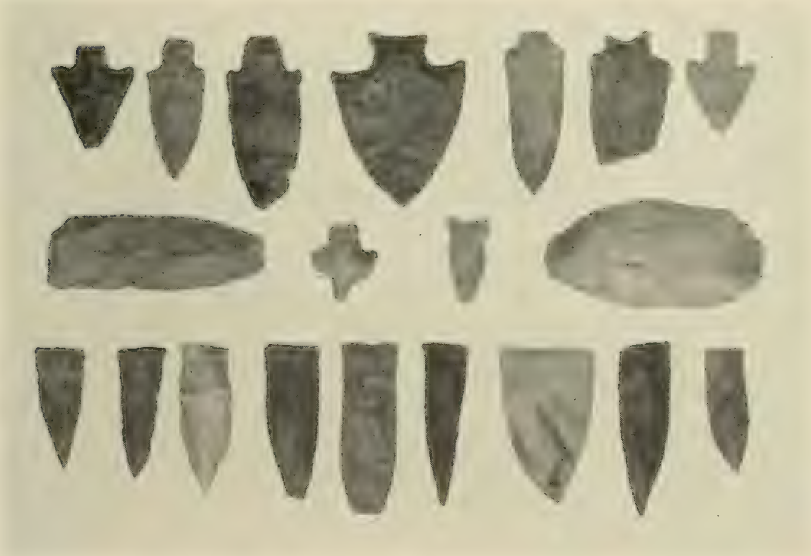
1. Fragments of Vessels and Four-Leg Bases, Hole-Tempered Ware, Type 6, Site Lu^{v} 65.



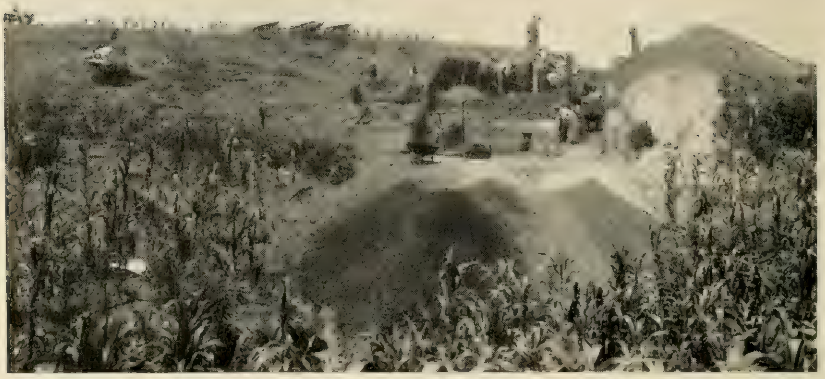
2. Drawing Reproduction of Pot. Height, 7.4 Inches; Maximum Diameter 8.25 Inches; Mouth Diameter, 8 Inches. Site Lu^{v} 65.



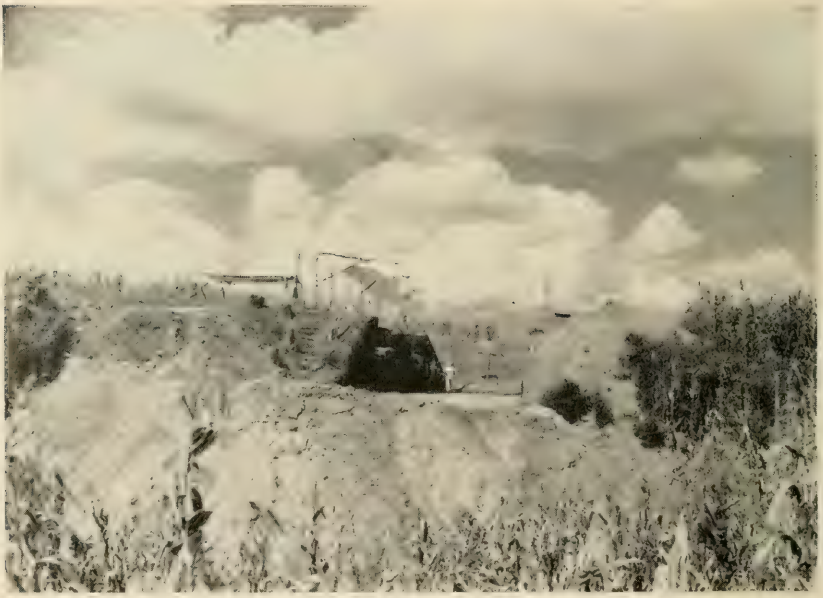
1. PROJECTILE POINTS, TYPE 37 AND TYPE 2. SITE LU^{v} 65.



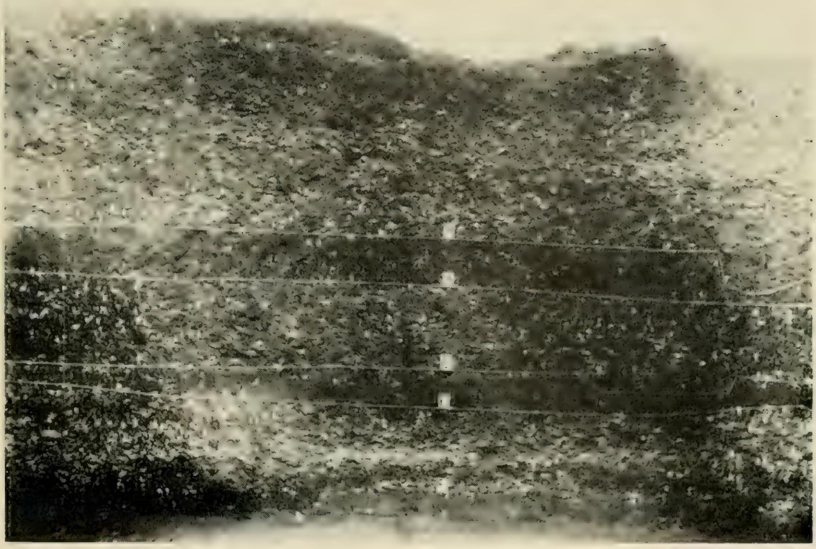
2. VARIOUS FORMS OF PROJECTILE POINTS; LOWER ROW, COPENA TYPES. SITE LU^{v} 65.



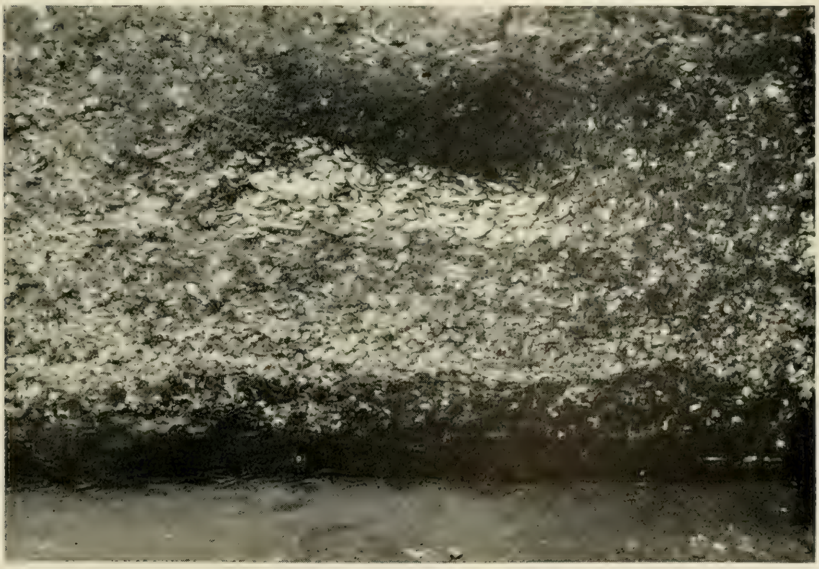
1. STARTING TRENCH FROM THE EAST. SITE LU° 67.



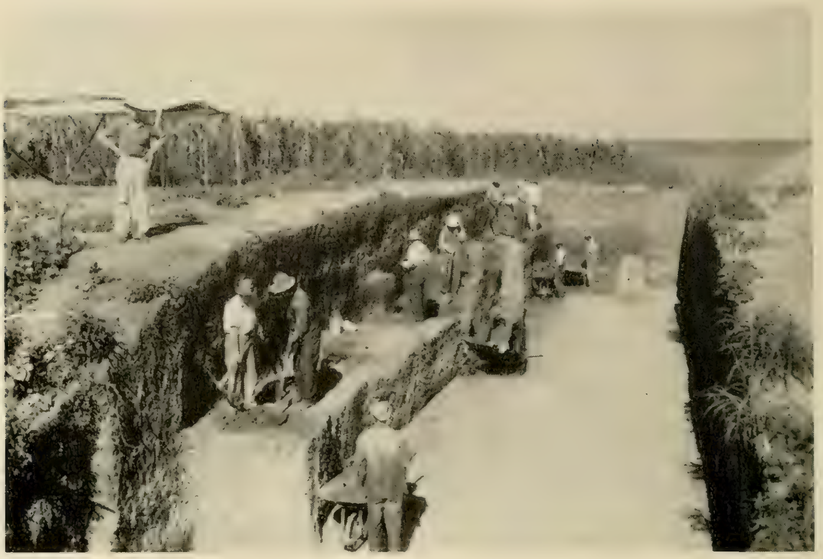
2. PROFILE SHADED TO PREVENT EXCESSIVE DRYING. SITE LU° 67



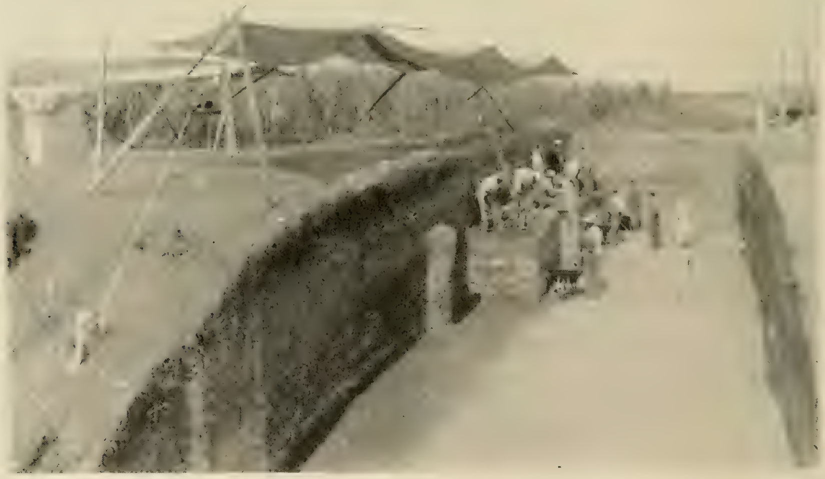
1. PROFILE, SHOWING ZONES A TO E. SITE LU° 67.



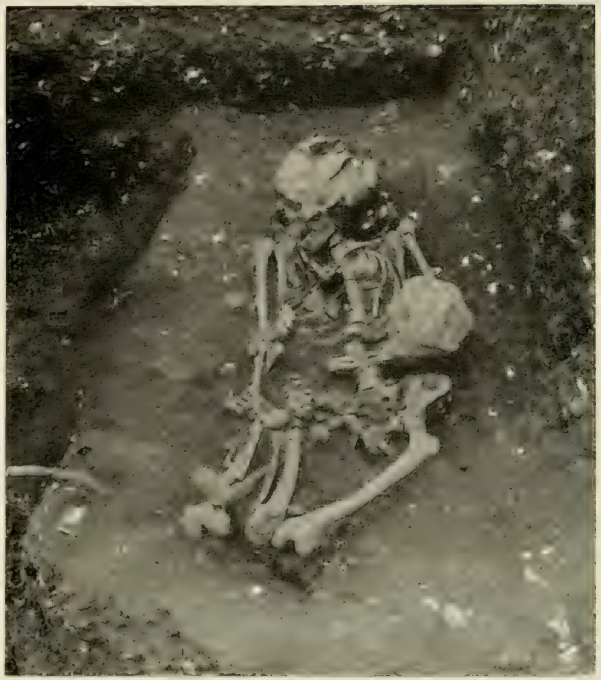
2. PROFILE, SHOWING CONCENTRATION OF BIVALVES WITH OVERLAYER OF DARK ASH; POSSIBLY A CLAMBAKE. SITE LU° 67.



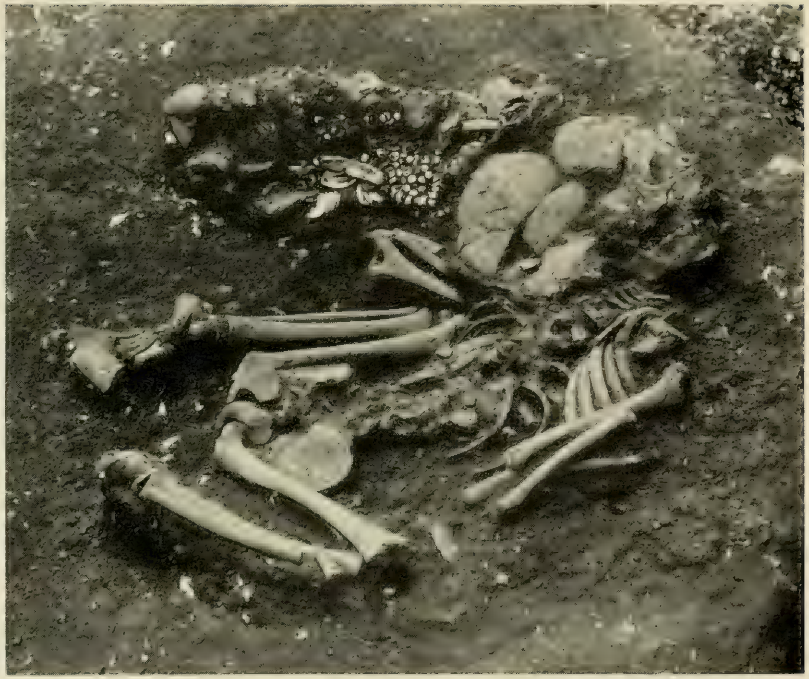
1. TRENCH CUT DOWN IN 5-FOOT BLOCKS. SITE Lu° 67.



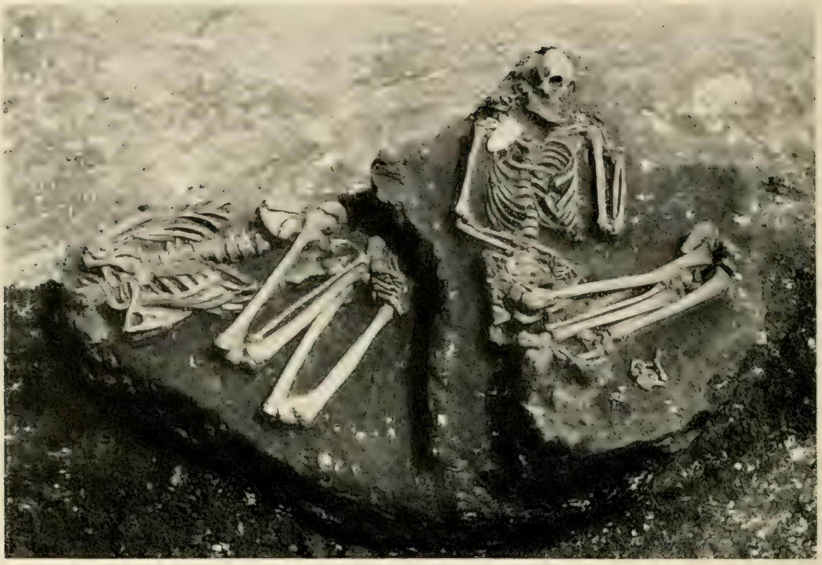
2. NEW PROFILE, SHOWING VARIATION IN CONCENTRATION OF SHELLS. SITE Lu° 67.



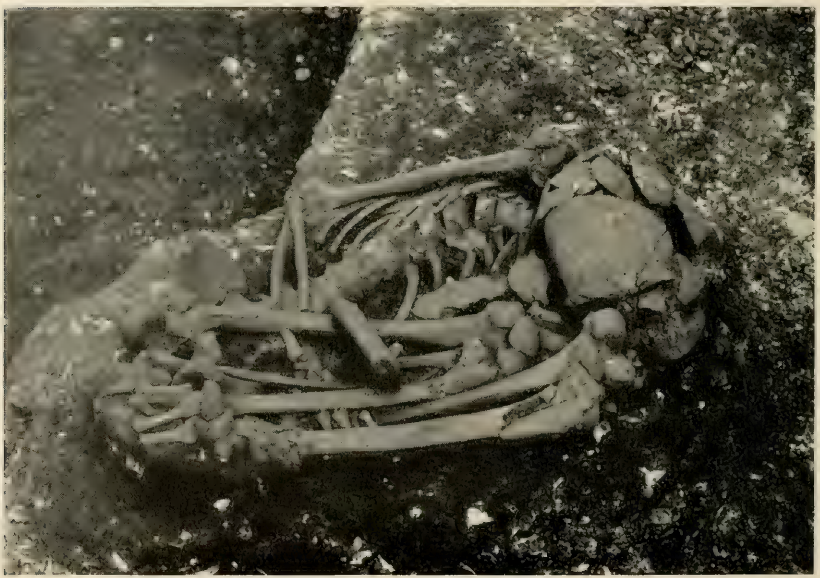
1. Burial No. 7. Skeleton Extended. Lower Limbs Folded Back. Site Lu° 67.



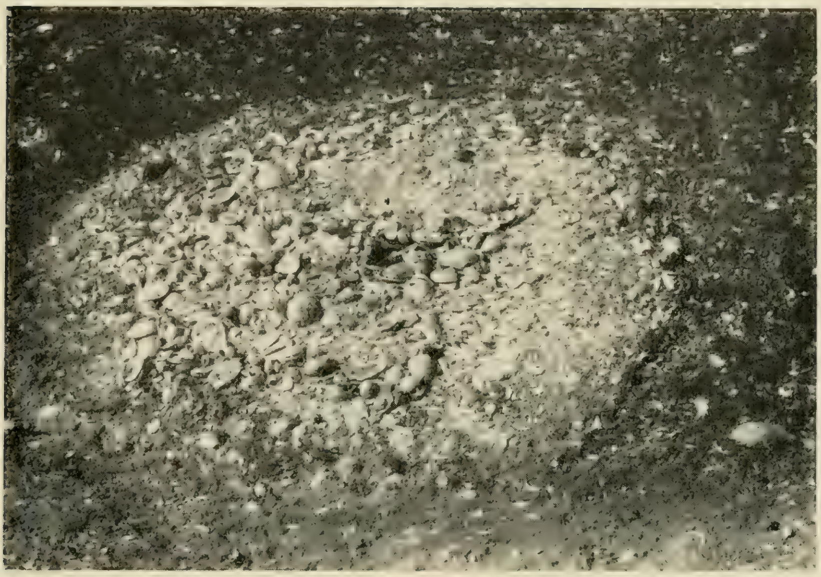
2. Burial No. 38. Typical "Frog" Burial. Note Associated Artifact and Deposit of Cremated Remains. Site Lu° 67.



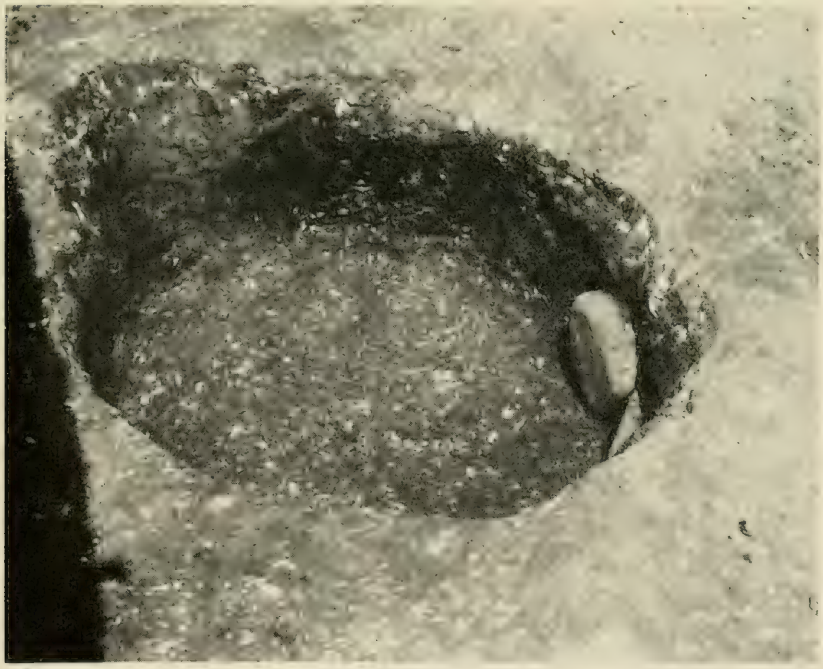
1. Burials Nos. 33 and 34 (Headless). Site Lu° 67.



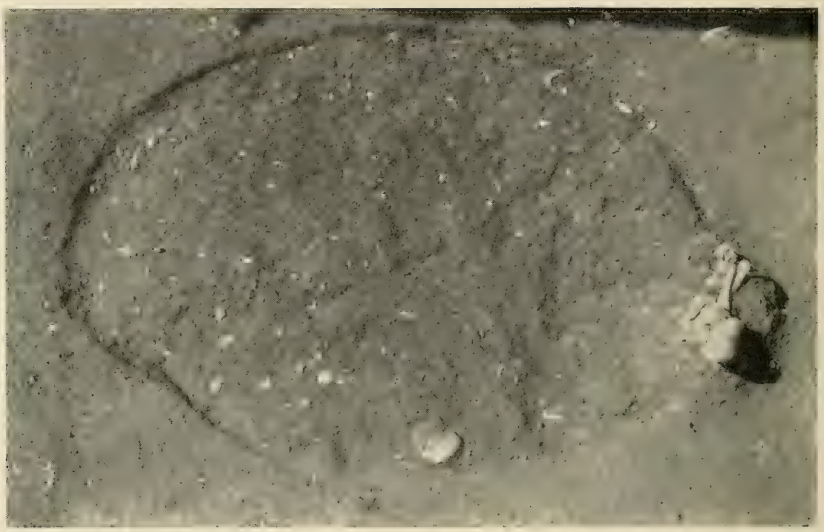
2. Burial No. 35. Fully Flexed. Site Lu° 67.



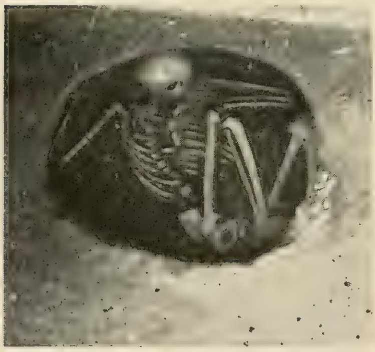
1. CIRCULAR PIT FILLED WITH CLEAN SHELLS. SITE LU° 67.



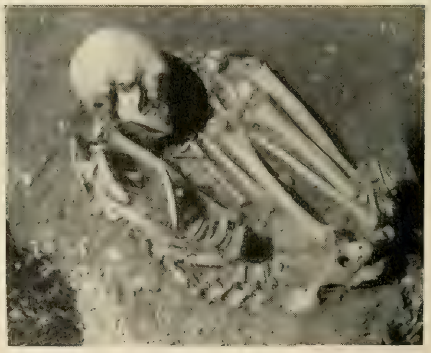
2. CIRCULAR PIT COMPLETELY EXCAVATED. SITE LU° 67.



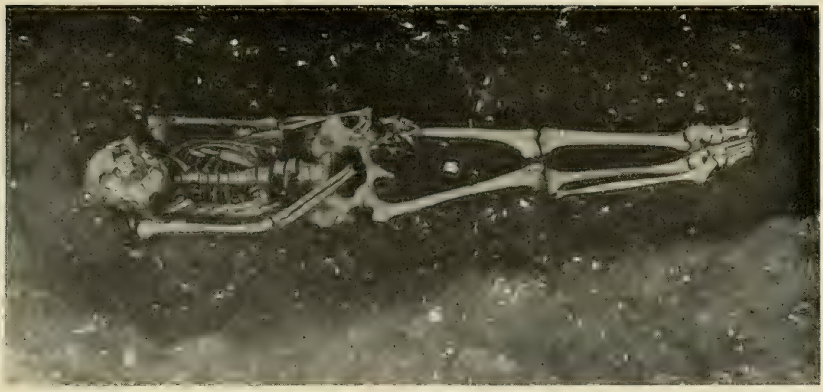
1. BURIAL NO. 58, IN CIRCULAR PIT; ONE FOOT OF SKELETON EXPOSED. SITE LU° 67.



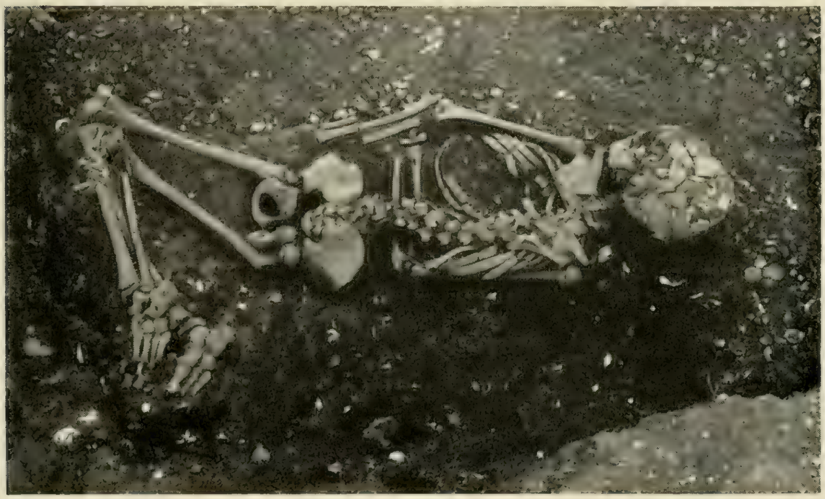
2. BURIAL NO. 58, EXPOSED IN PIT. SITE LU° 67.



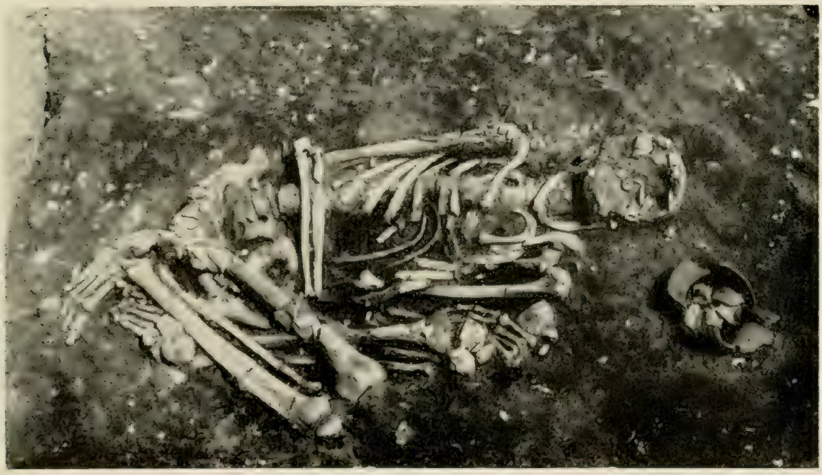
3. BURIAL NO. 54, FULLY FLEXED IN "ROUND GRAVE." SITE LU° 67.



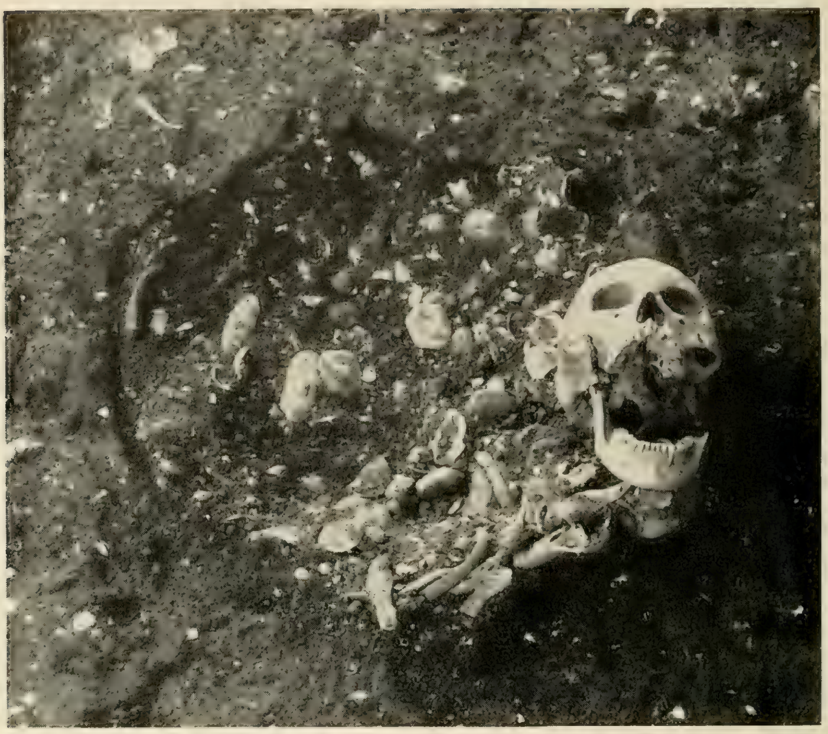
1. BURIAL NO. 57. ONLY FULLY EXTENDED BURIAL FOUND AT SITE LU° 67.



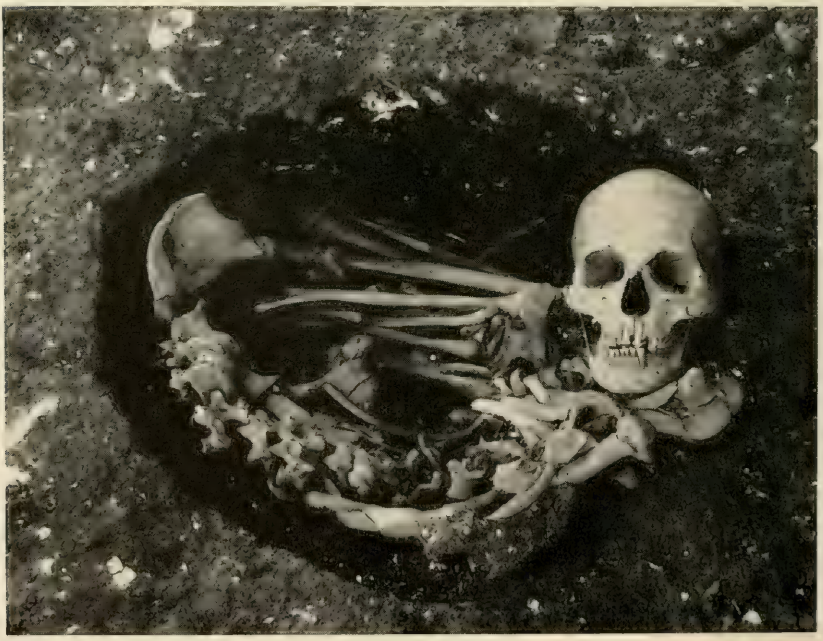
2. BURIAL NO. 51. PARTLY FLEXED. FACE DOWN. SITE LU° 67.



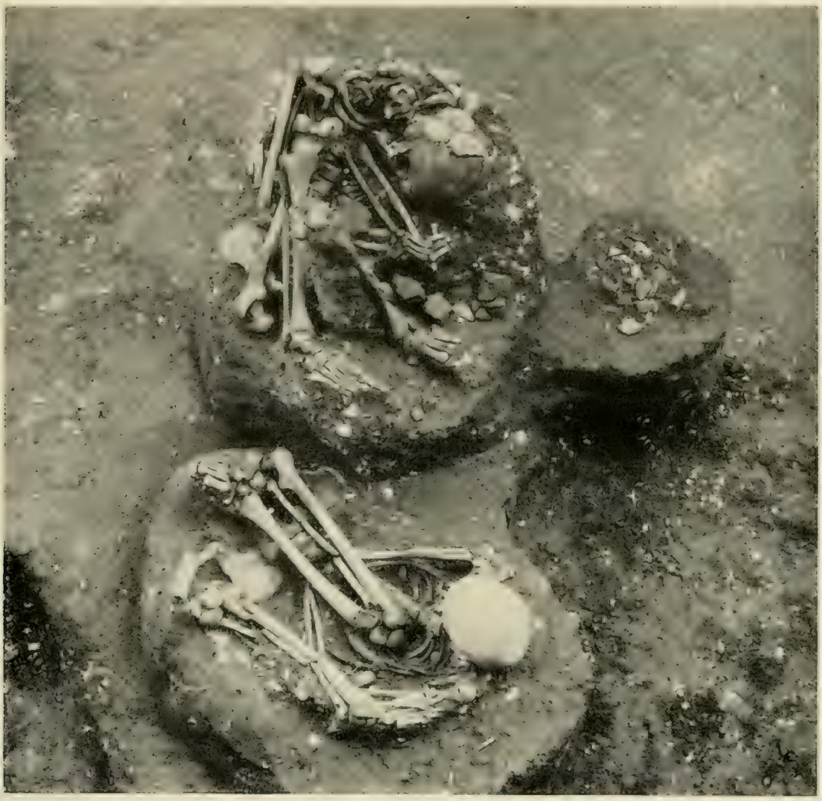
3. BURIAL NO. 44 (ADULT). WITH BURIAL NO. 46 (INFANT) IN SMALL VESSEL. SITE LU° 67.



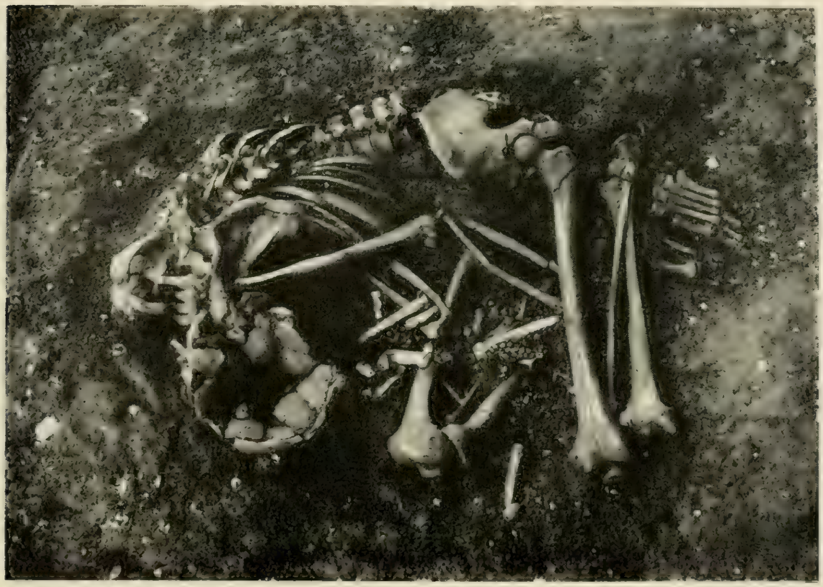
1. BURIAL NO. 73 IN CIRCULAR PIT. SITE LU° 67.



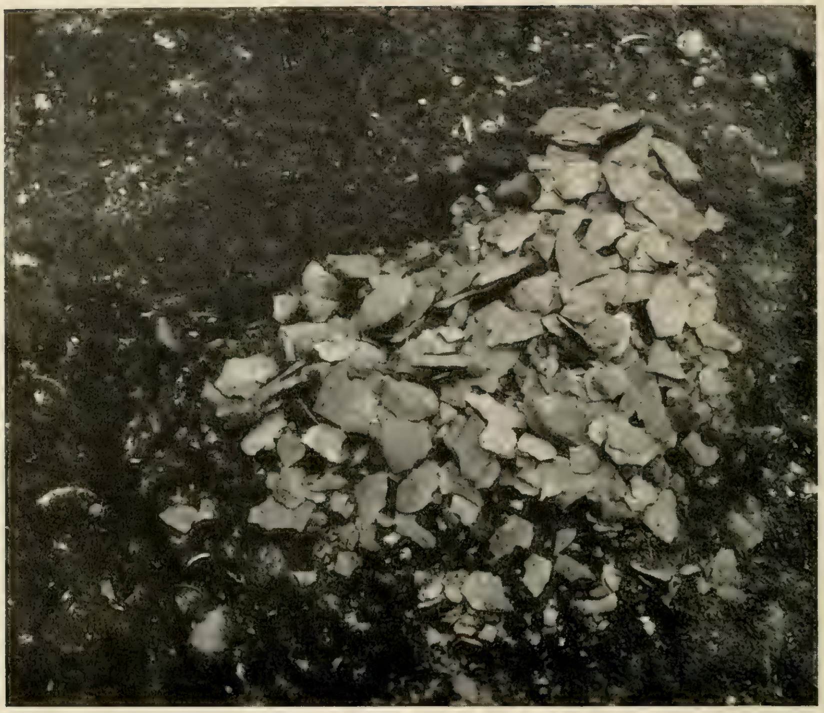
2. BURIAL NO. 73 AFTER EXCAVATION. SKULL HAD TO BE LIFTED AND REPLACED TO PERMIT EXCAVATION OF PIT. SITE LU° 67.



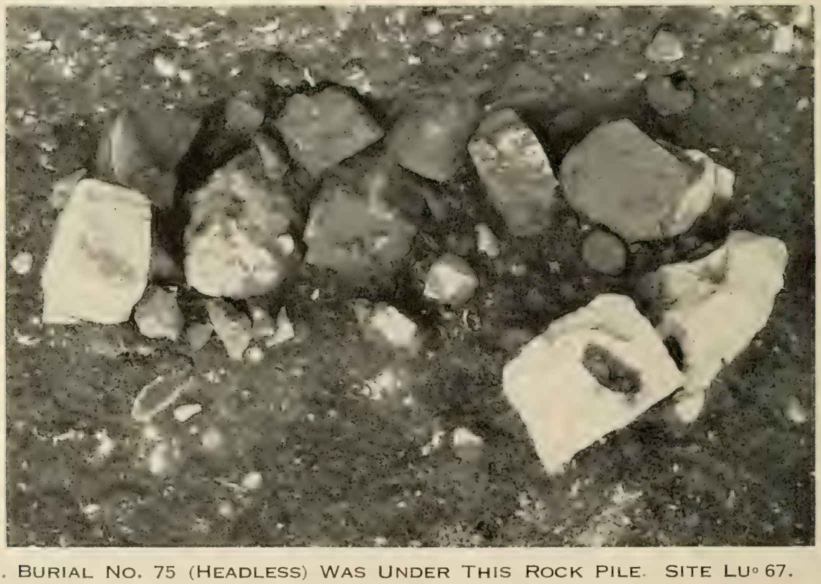
1. BURIALS NOS 65, 66, AND 67; NO. 66, A CREMATION. SITE LU° 67.



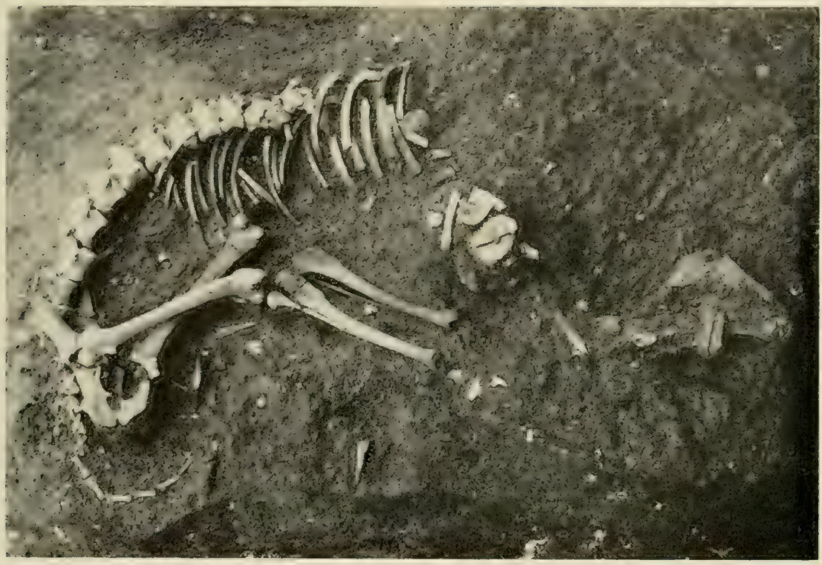
2. BURIAL NO. 81 WITH MANY ARTIFACTS. SITE LU° 67.



1. FEATURE NO. 1. CACHE OF FLINT CHIPS. SITE LU° 67.

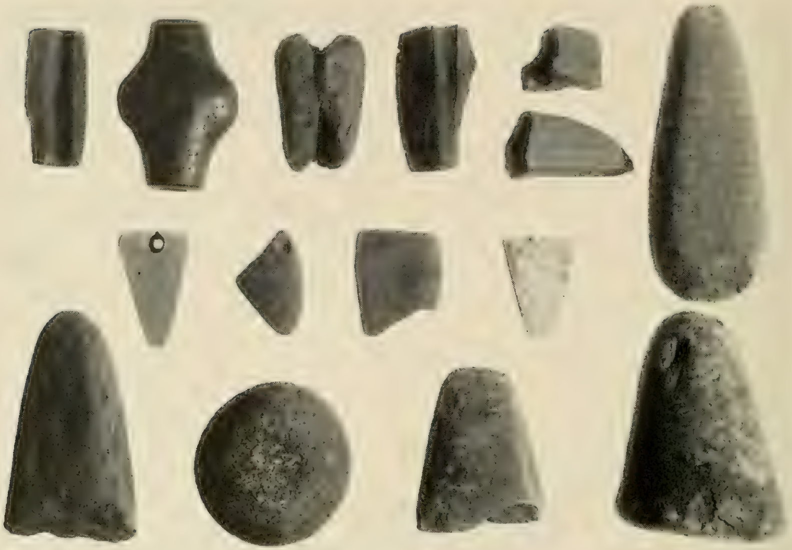


2. BURIAL NO. 75 (HEADLESS) WAS UNDER THIS ROCK PILE. SITE LU° 67.

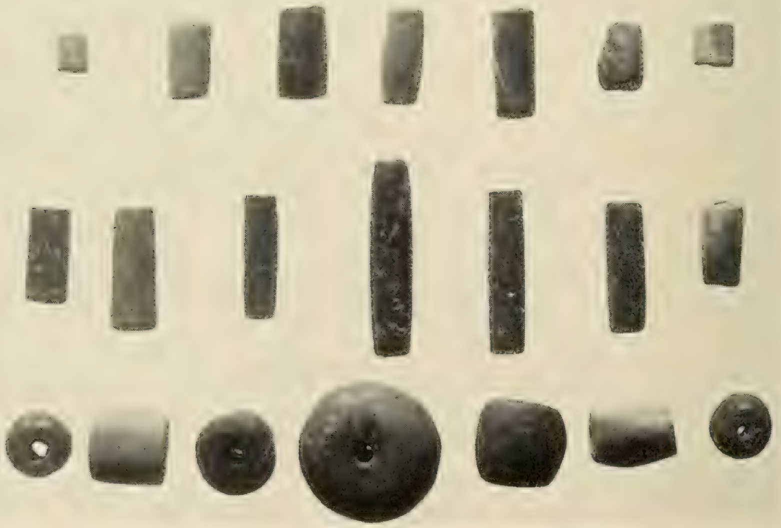


1. SKELETON OF DOG. SITE Lu° 67.

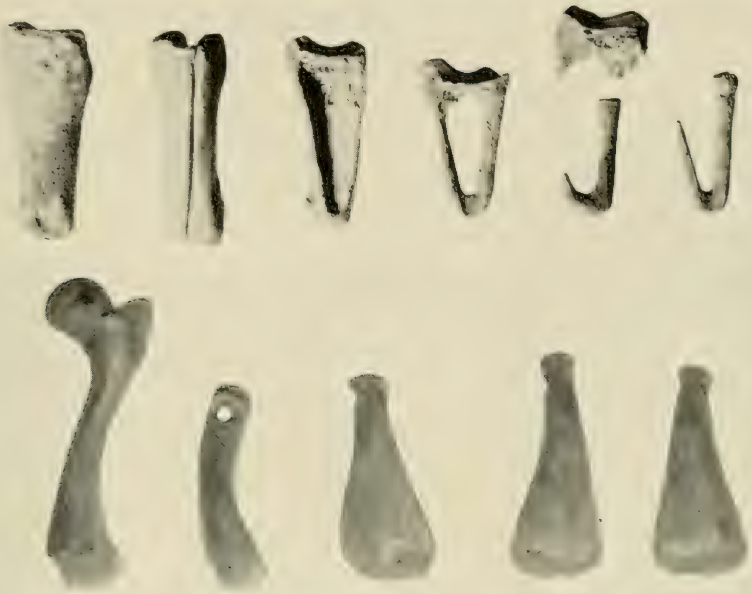
2. SECTION OF CLAY FIREPLACE; 6 FEET BELOW SQUARE 20L1. SITE Lu° 67.



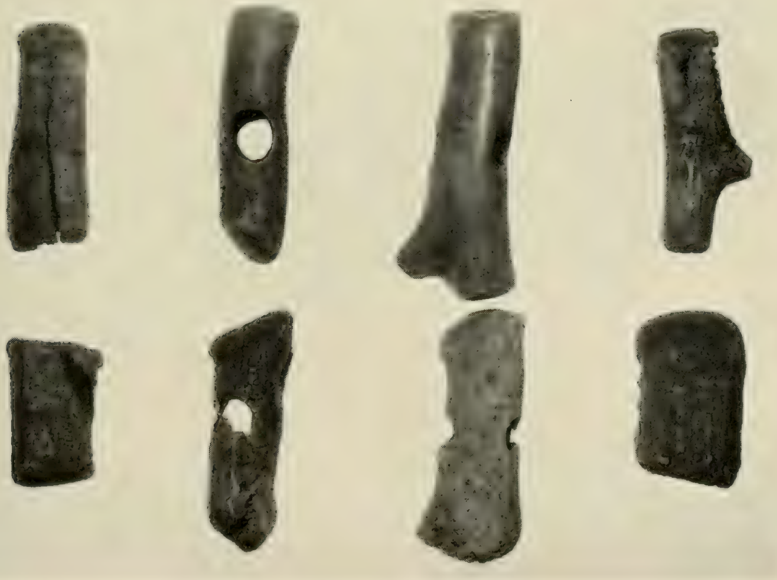
1. STONE ARTIFACTS FROM GENERAL DIGGING. SITE LU° 67.



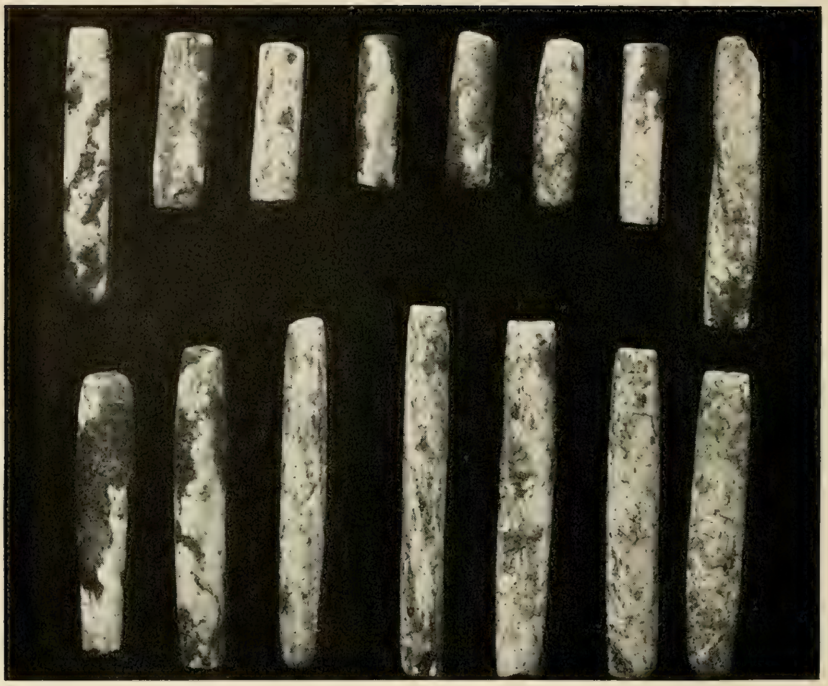
2. STONE BEADS, CYLINDRICAL AND SPHERICAL. SITE LU° 67.



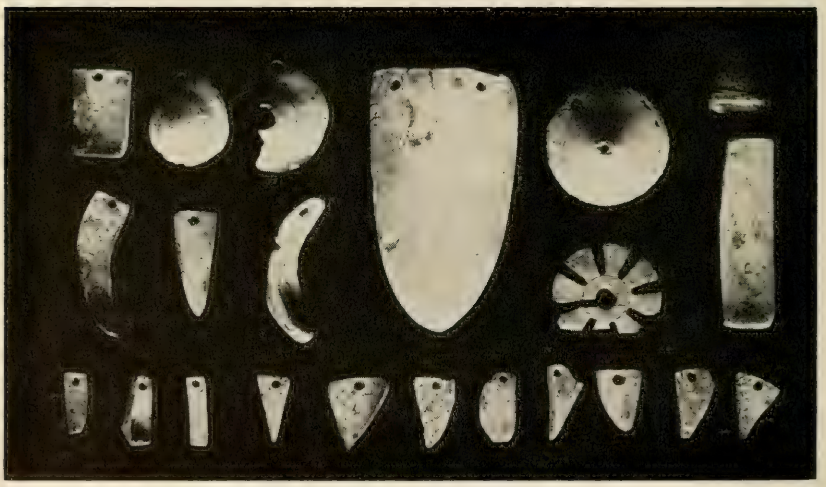
1. STAGES IN THE PRODUCTION OF FISHHOOKS FROM TOE BONES OF DEER AND PENDANTS FROM LEG BONES OF TURTLE (*Chelydra*). SITE LU° 67.



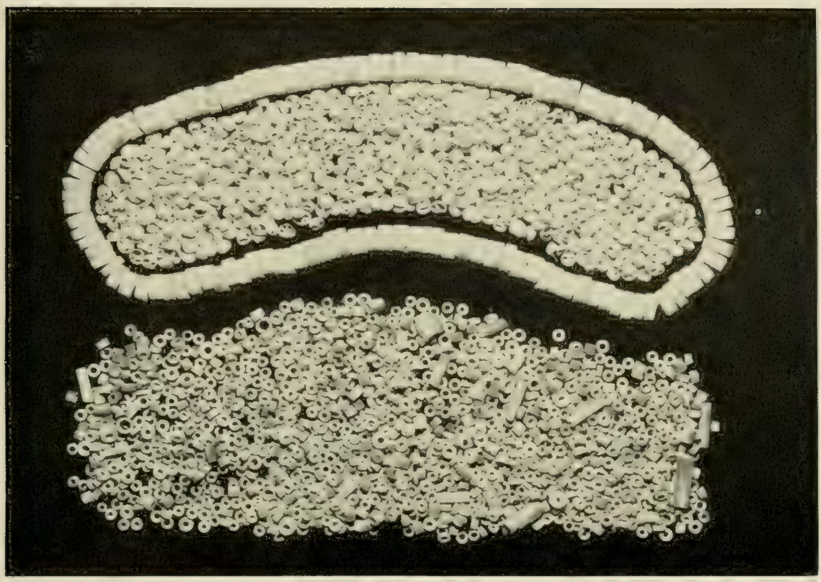
2. DRILLED ANTLER TOOLS, DRIFTS, AND CHISELS. SITE LU° 67.



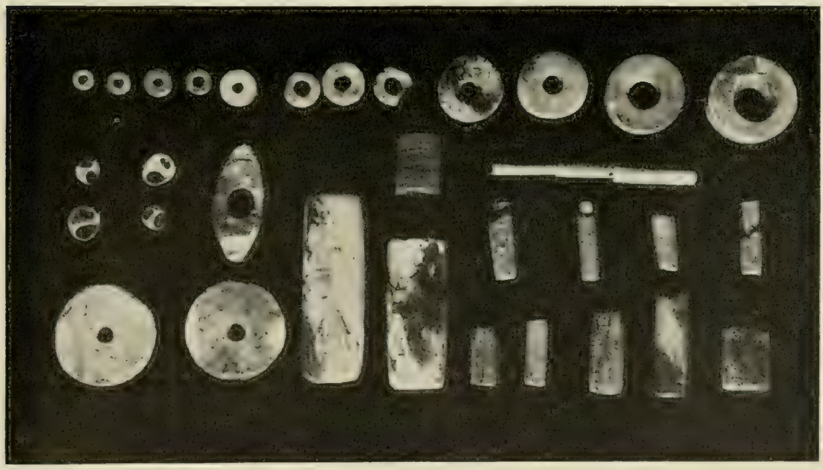
1. LONG CYLINDRICAL SHELL BEADS. SITE LU° 67.



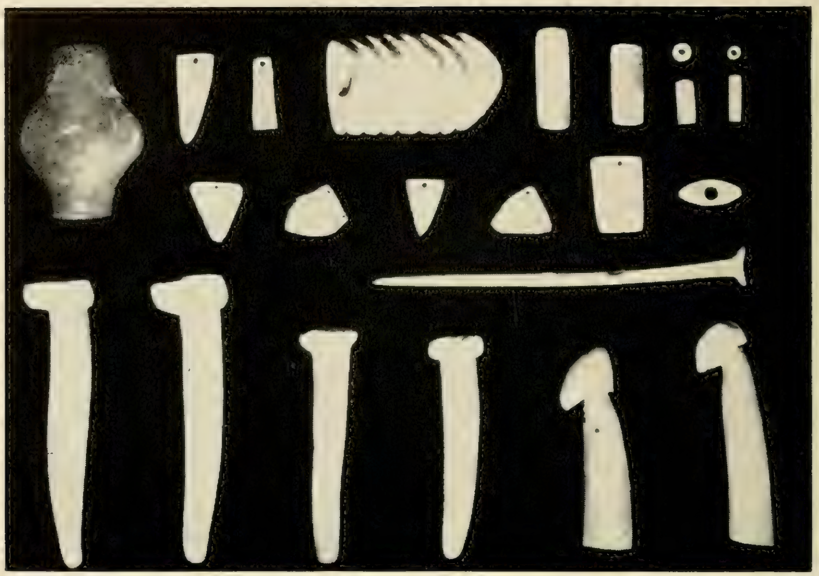
2. SHELL PENDANTS. SITE LU° 67.



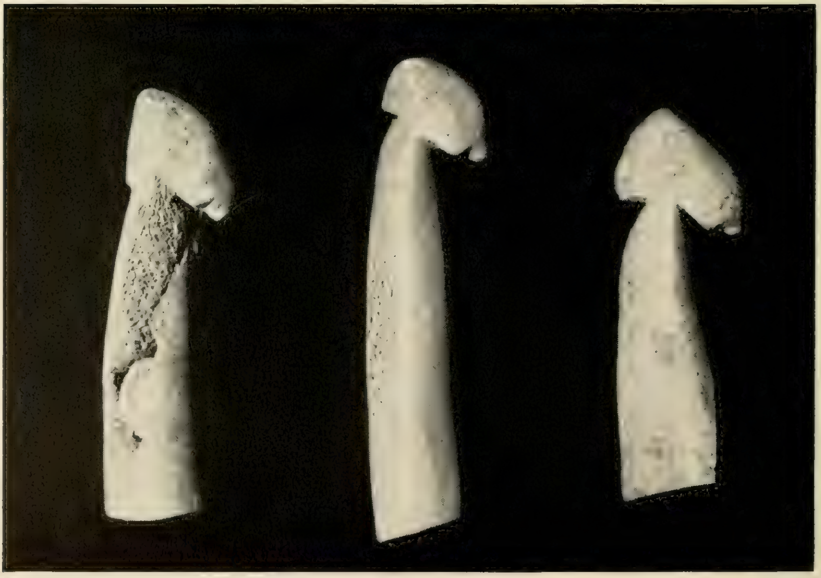
1. SMALL SHELL BEADS, DISKS, AND *Anculosa*. SITE Lu° 67.



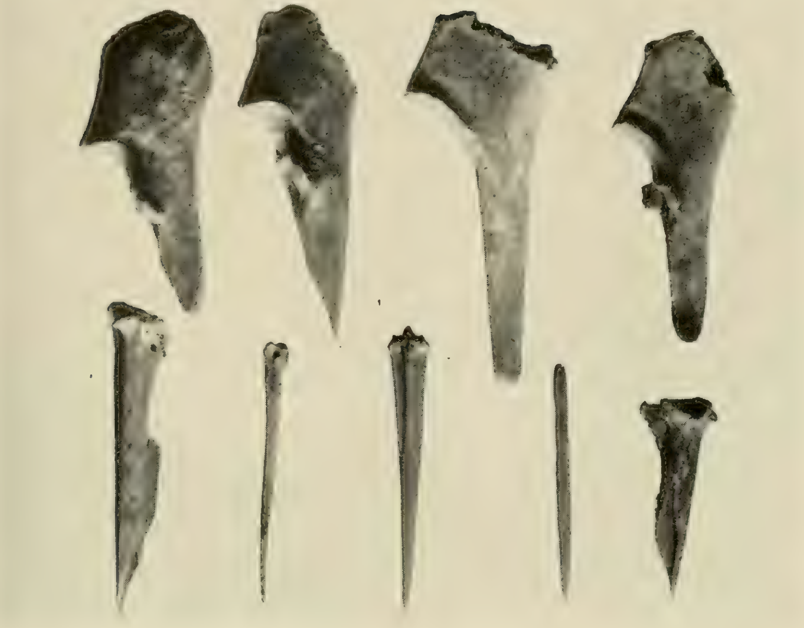
2. SHELL BEADS, VARIOUS FORMS. SITE Lu° 67.



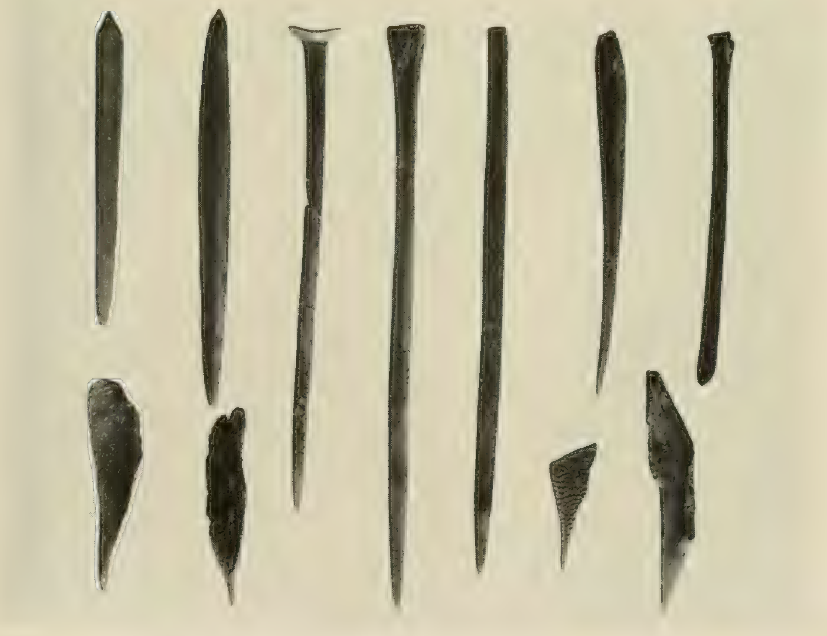
1. ARTIFACTS FROM BURIAL NO. 81. SITE LU° 67.



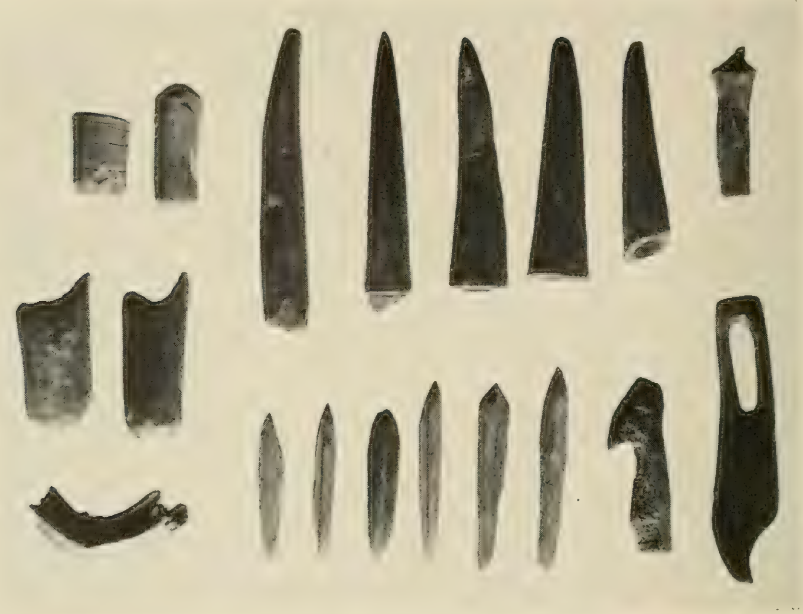
2. CARVED HORN, PROBABLY ATLATL HOOKS. SITE LU° 67.



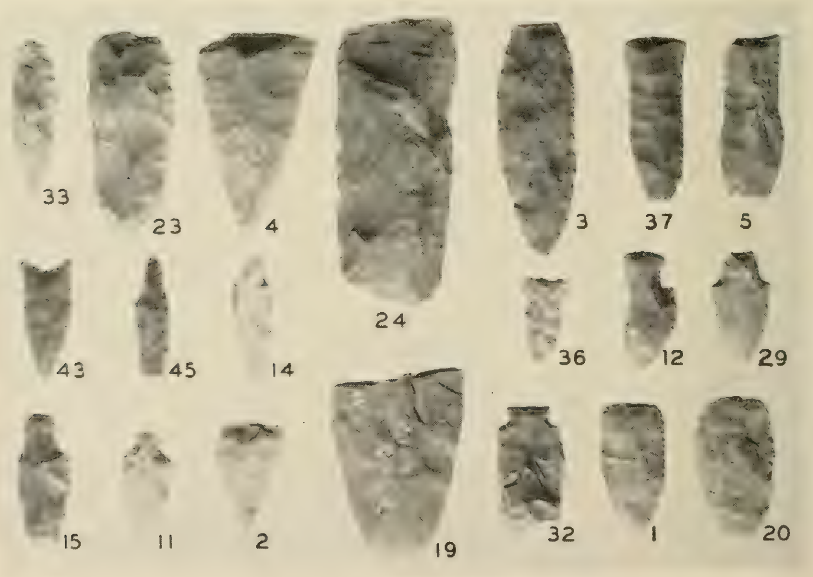
1. AWLS FROM BONES OF DEER AND TURKEY. SITE LU° 67.



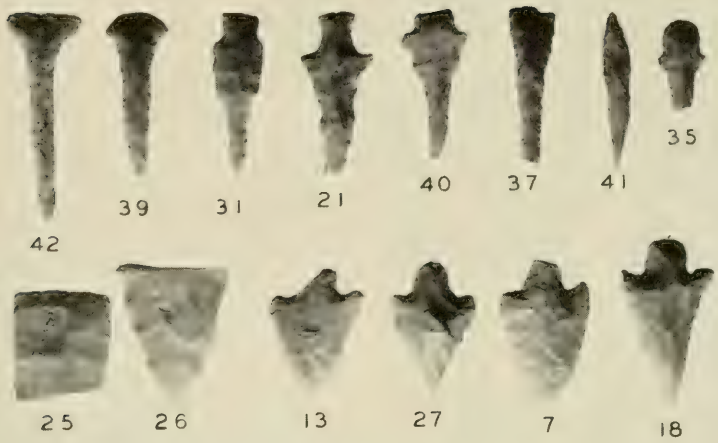
2. AWLS FROM BONE SPLINTERS. SITE LU° 67.



1. CUT HORN AND BONE; LOWER LEFT CUT FROM HUMAN JAW. SITE LU° 67.


33
23
4
24
3
37
5
43
45
14
36
12
29
15
11
2
19
32
1
20

2. FLINT; TYPE FORMS. SITE LU° 67.


42
39
31
21
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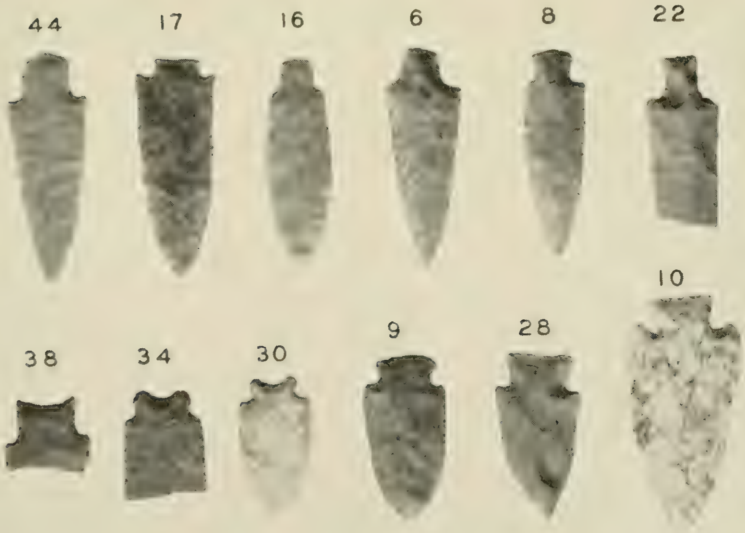
27
7
18

1. FLINT; TYPE FORMS. SITE LU° 67.


44
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16
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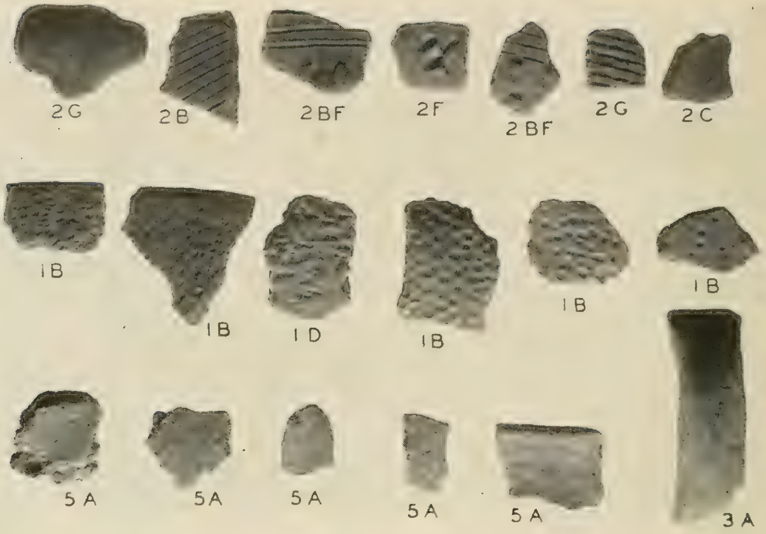
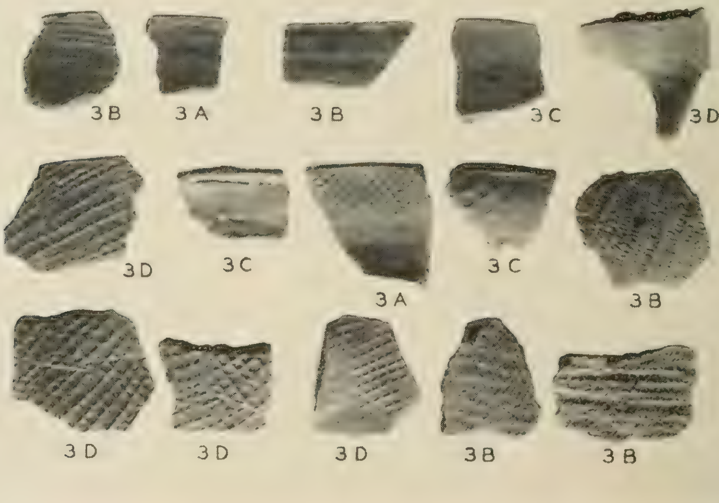
8
22
38
34
30
9
28
10

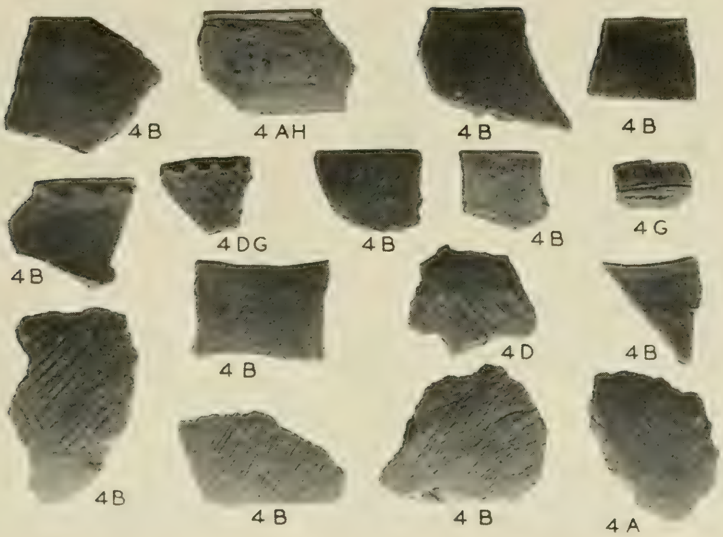
2. FLINT; TYPE FORMS. SITE LU° 67.


2 G
2 B
2 BF
2 F
2 BF
2 G
2 C
1 B
1 B
1 D
1 B
1 B
1 B
5 A
5 A
5 A
5 A
5 A
3 A

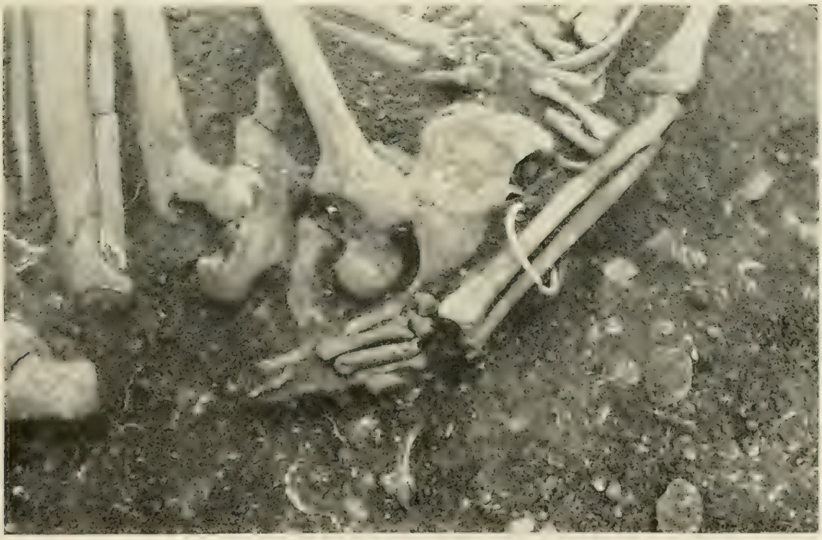
1. POTTERY SHERDS, TYPE 1 (FIBER-TEMPERED); TYPE 2 (SAND-TEMPERED); AND TYPE 5 (SHELL-TEMPERED). SITE LU° 67.


3 B
3 A
3 B
3 C
3 D
3 D
3 C
3 A
3 C
3 B
3 D
3 D
3 D
3 B
3 B

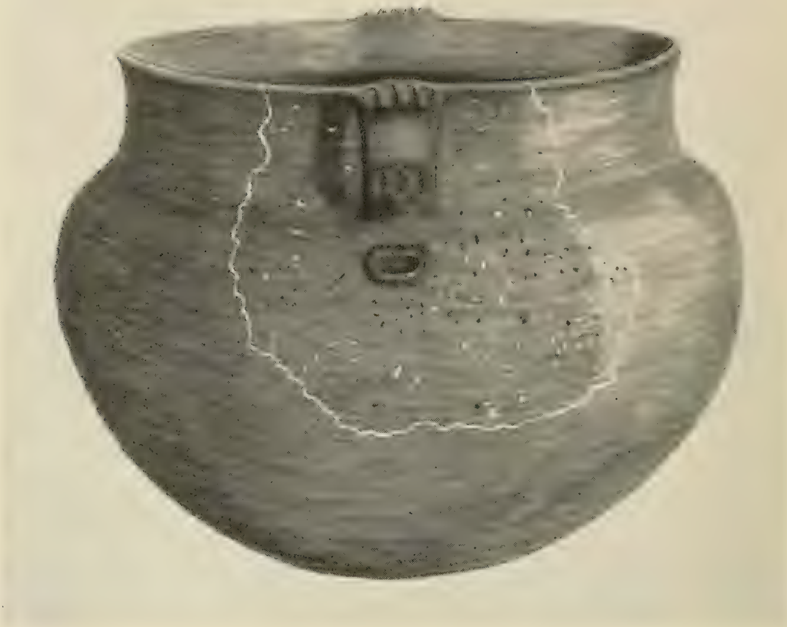
2. LIMESTONE-TEMPERED POTTERY SHERDS, TYPE 3. SITE LU° 67.


4 B
4 AH
4 B
4 B
4 B
4 DG
4 B
4 B
4 G
4 B
4 D
4 B
4 B
4 B
4 B
4 A

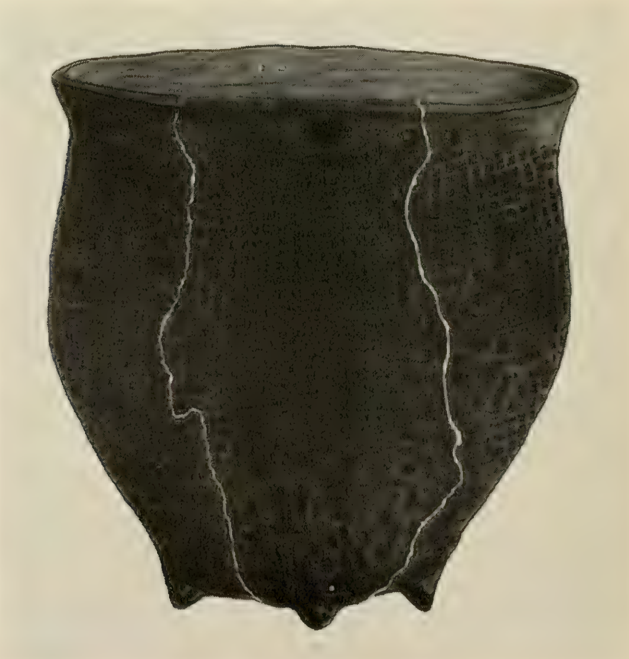
1. CLAY-GRIT-TEMPERED POTTERY SHERDS, TYPE 4. SITE LU° 67.



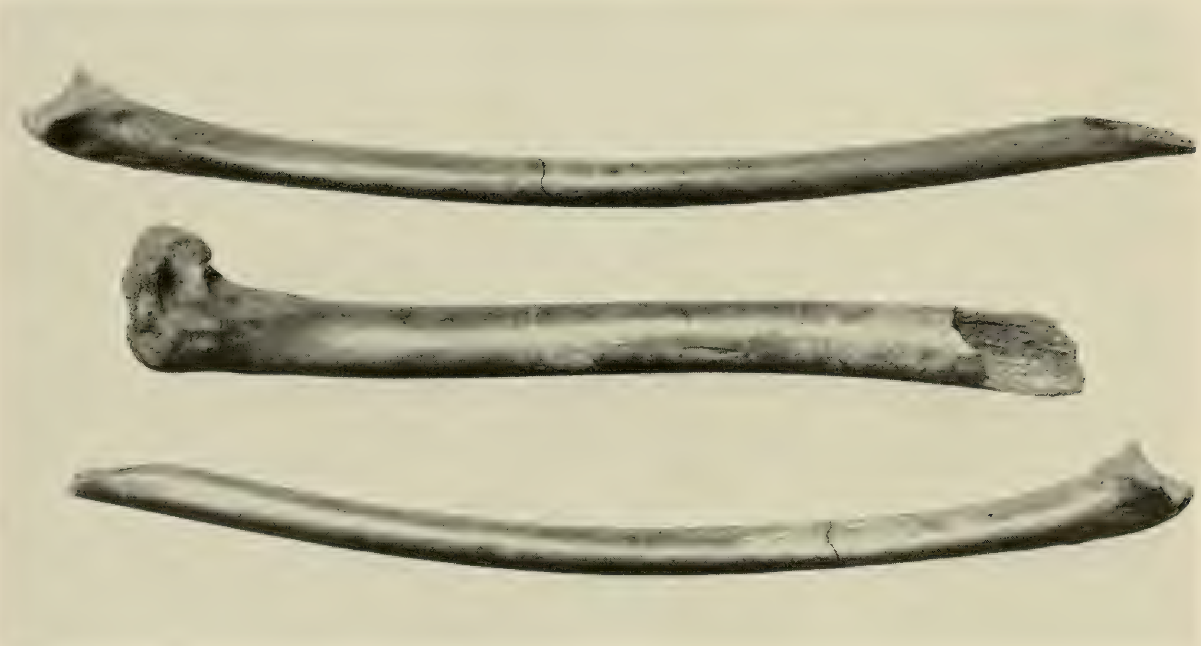
2. BURIAL NO. 91, SHOWING COPPER BRACELET ON LEFT ARM. SITE LU° 67.



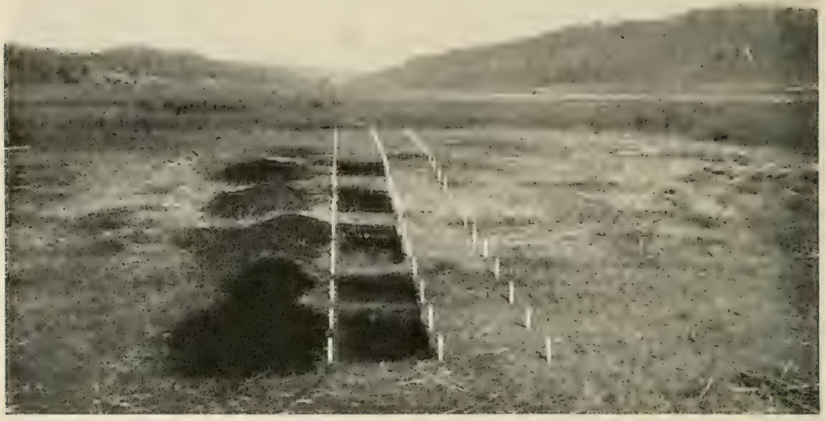
1. Drawing Reproduction of Pot. Height, 9 Inches; Maximum Diameter, 12 Inches; Mouth Diameter, 10 Inches. Site Lu° 67.



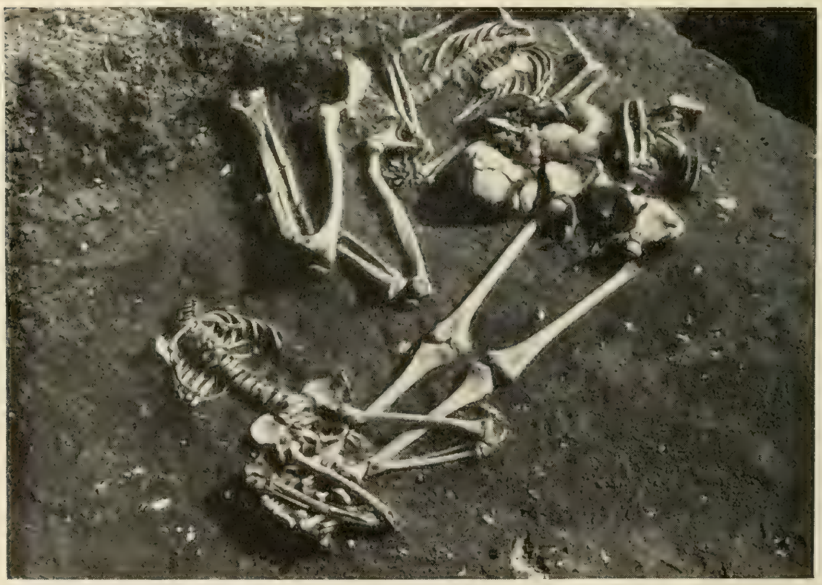
2. Drawing Reproduction of Pot, Maximum Diameter, 6.2 Inches; Height 6.7 Inches. Site Lu° 67.



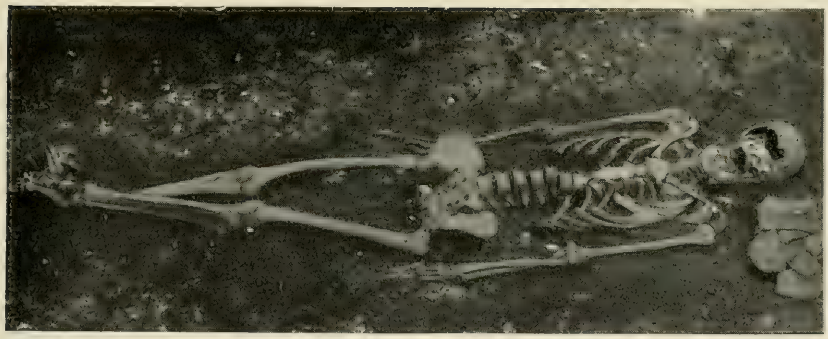
AWLS MADE FROM ULNAS AND ONE HUMERUS FROM THE TRUMPETER SWAN. *Cygnus buccinalor*, FROM BURIAL NO. 19. SITE LU° 67.



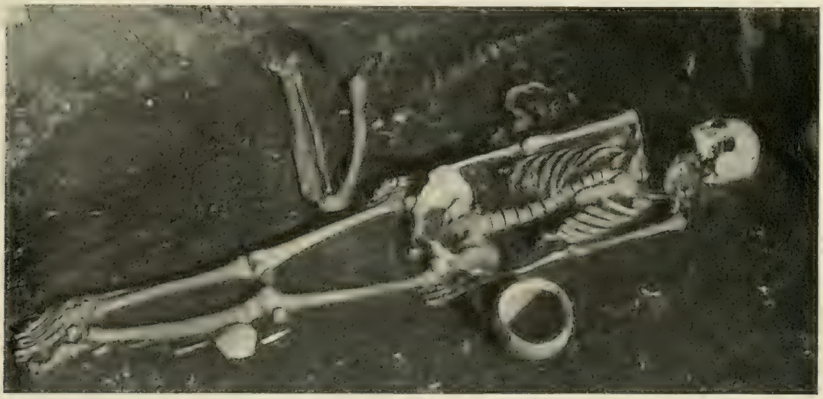
1. Trench System Laid on Deepest Part of Midden, Looking East. Site Lu° 72.



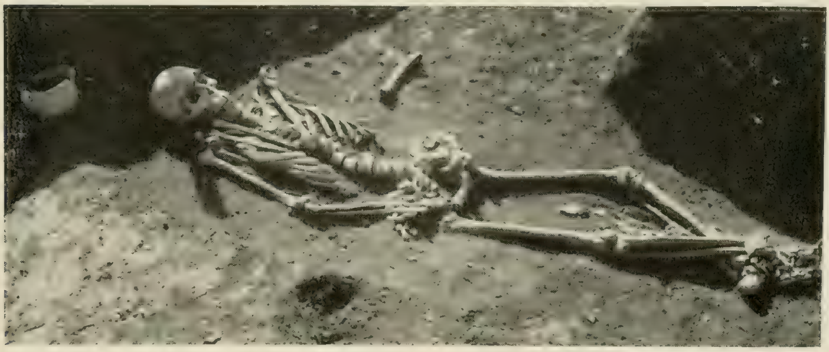
2. Burials Nos. 15, 16, and 17, All Three Headless; Two Skulls Buried Separately. Site Lu° 72.



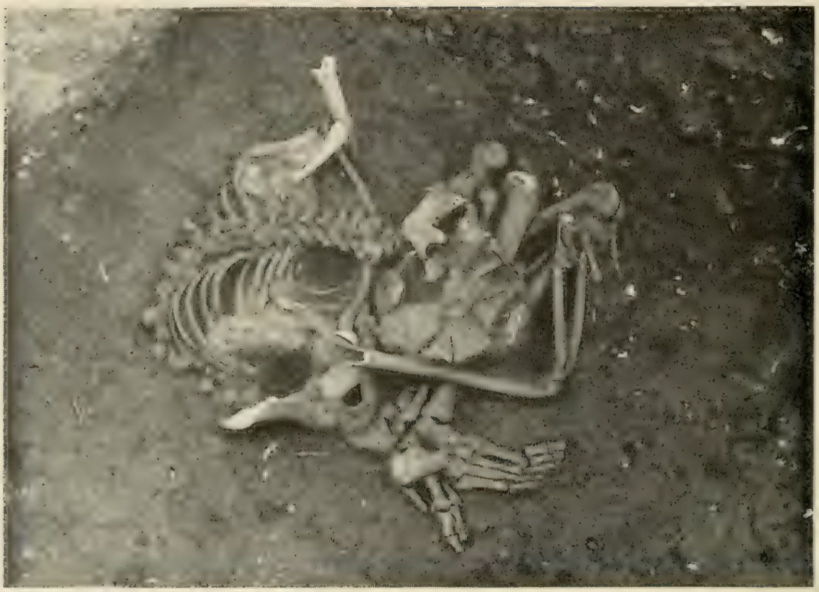
1. BURIAL NO. 9, EXTENDED, WITH CRUSHED POTTERY VESSEL. SITE Lu°72.



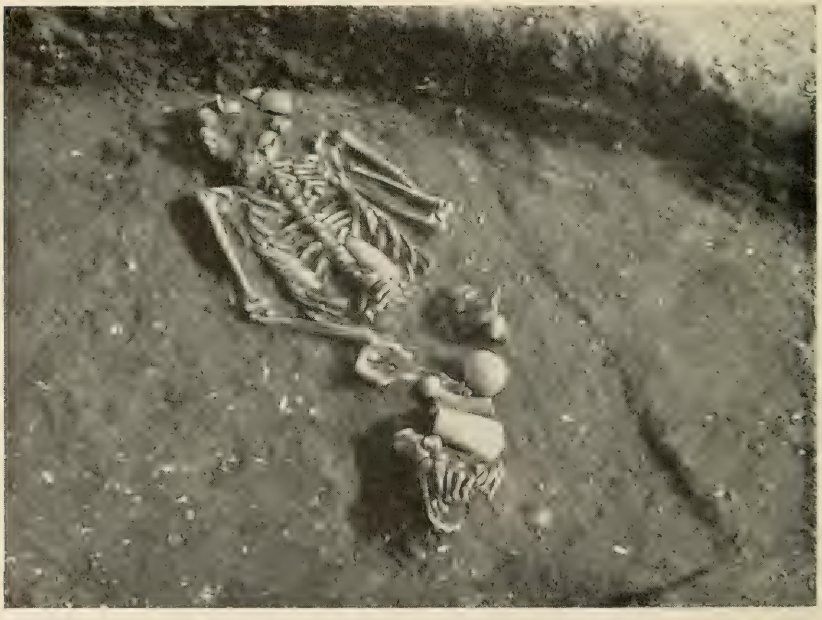
2. BURIAL NO. 2, WITH ASSOCIATIONS. SITE Lu°72.



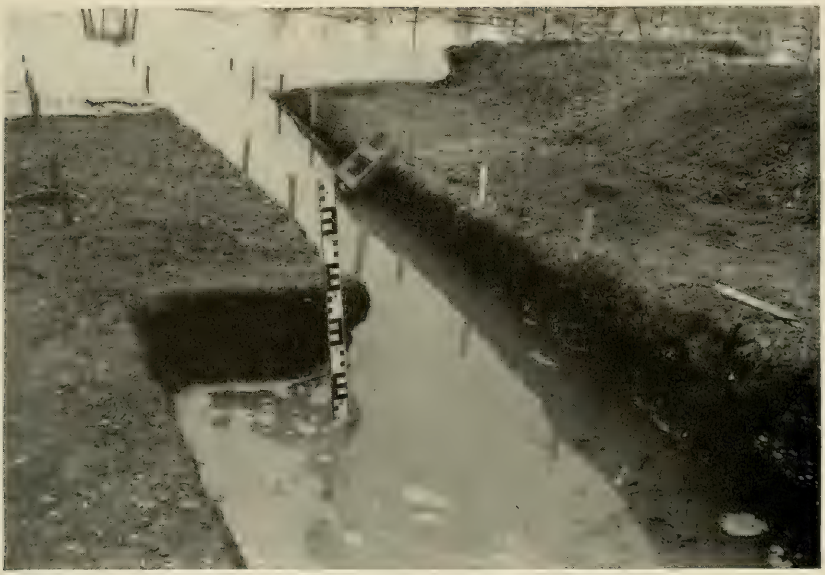
3. BURIAL NO. 6, WITH ASSOCIATIONS. SITE Lu°72.



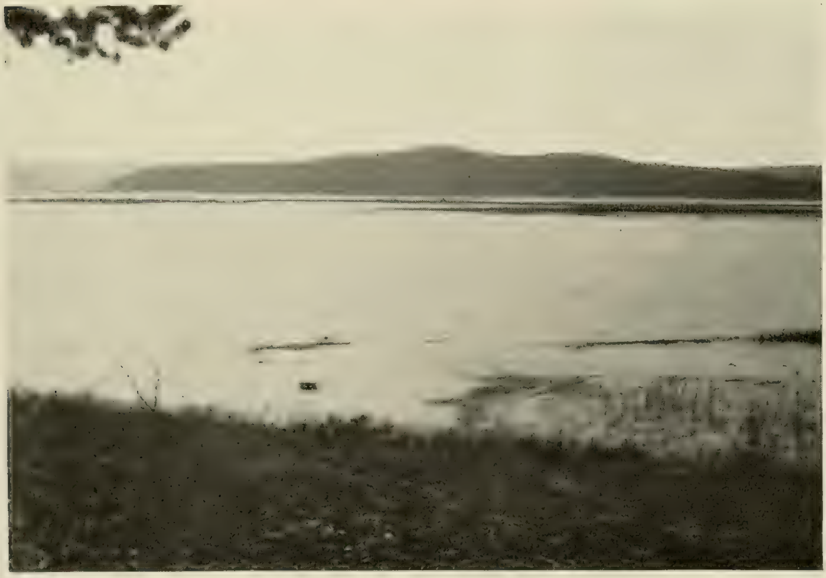
1. BURIAL NO. 21. A BURIAL ORIGINALLY IN SITTING POSTURE. SITE Luº72.



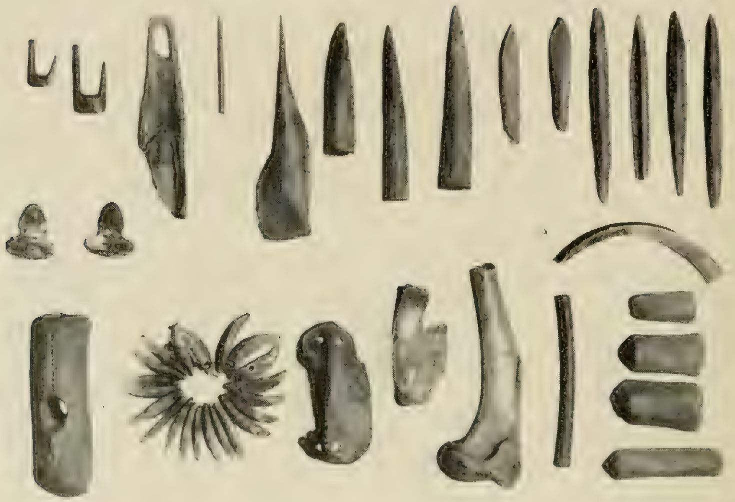
2. BURIAL NO. 3 (DISTURBED). SITE Luº72.



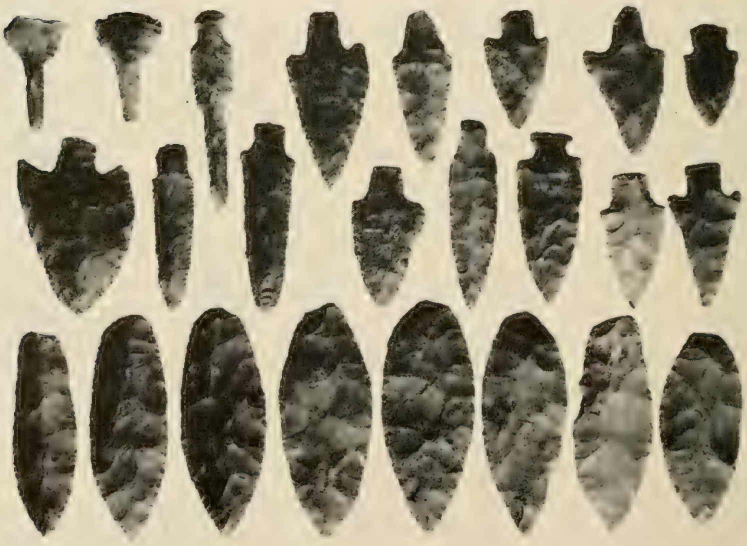
1. PREMATURE FLOODING OF PICKWICK BASIN GAVE THIS STADIA READING IN MAIN TRENCH. SITE LU° 72.



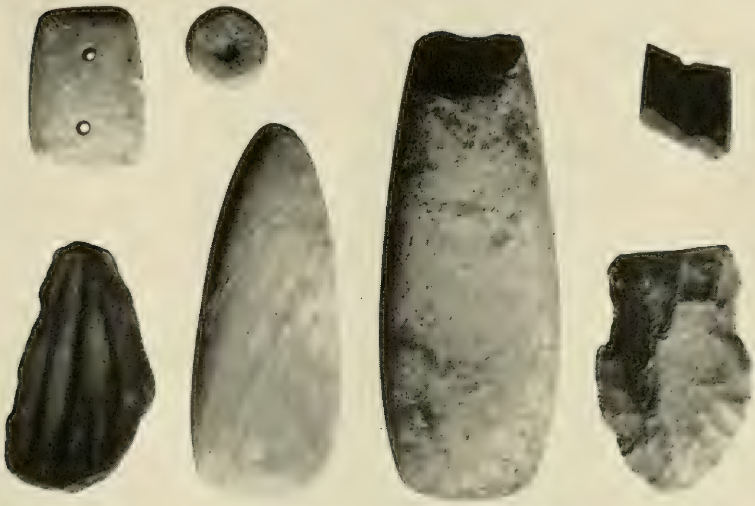
2. THE RAPID RISE OF FLOODWATER MADE RECOVERY OF TOOLS AND MATERIALS DIFFICULT. THE TENT, A SPECK IN THE DISTANCE, MARKS SITE, COMPLETELY SUBMERGED A FEW HOURS LATER. SITE LU° 72.



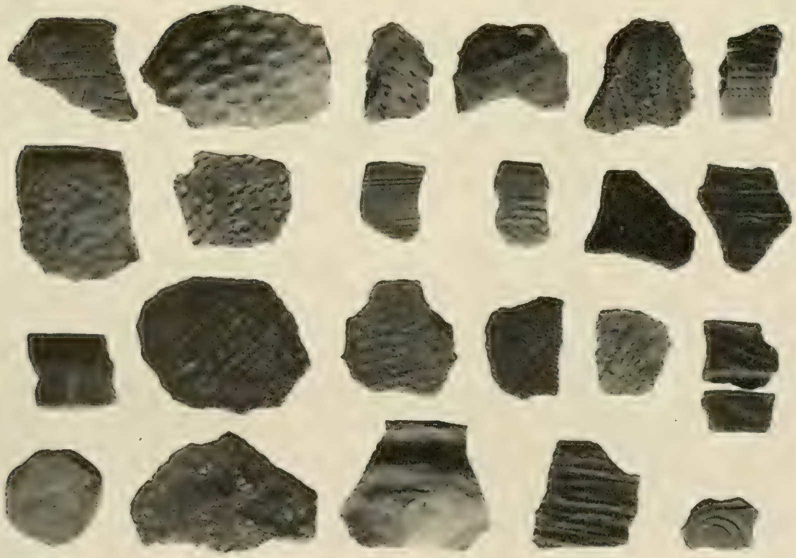
1. BONE ARTIFACTS FROM GENERAL DIGGING. SITE LU° 72.



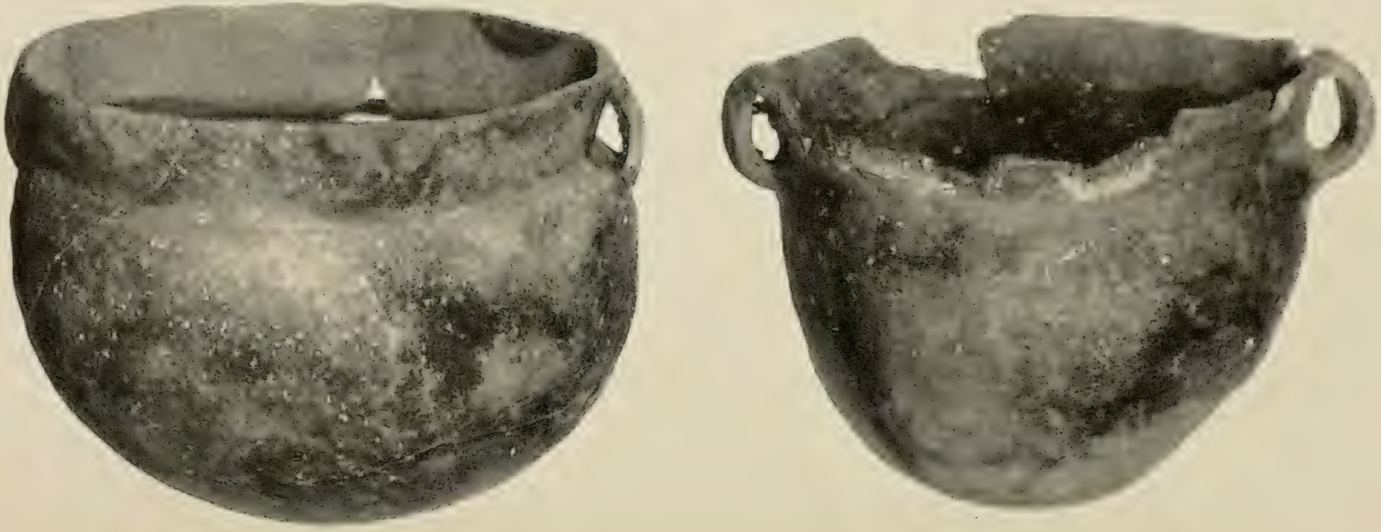
2. FLINT TYPES FROM GENERAL DIGGING. SITE LU° 72.



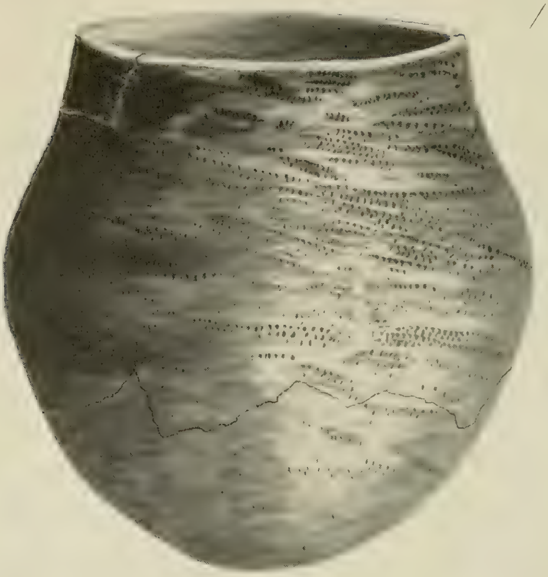
1. TYPICAL STONE ARTIFACTS. SITE Lu° 72.



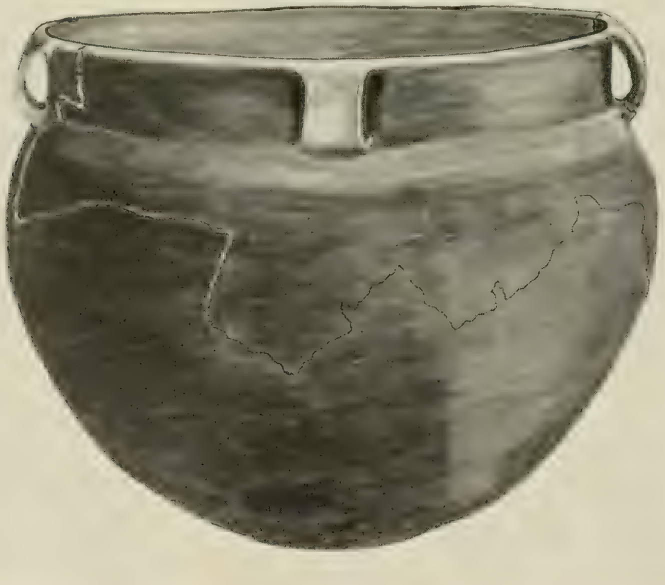
2. TYPES OF POTSHERDS. SITE Lu° 72.



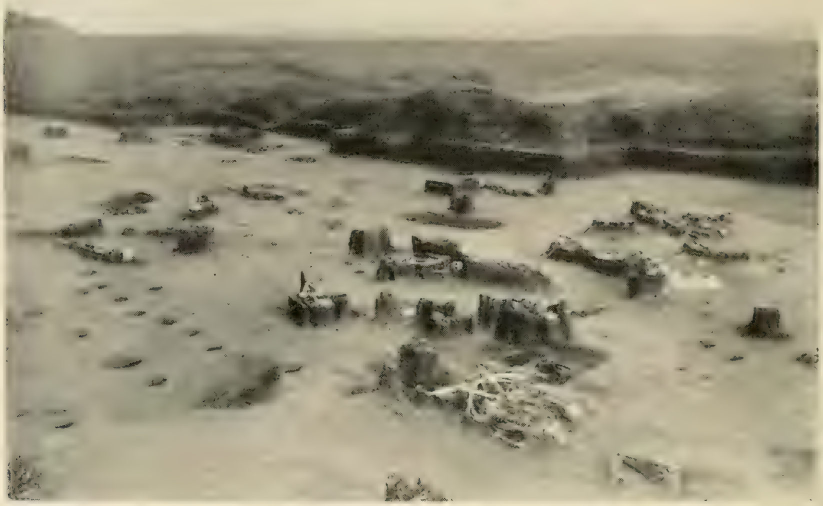
RESTORED MORTUARY VESSELS. SITE LU° 72.



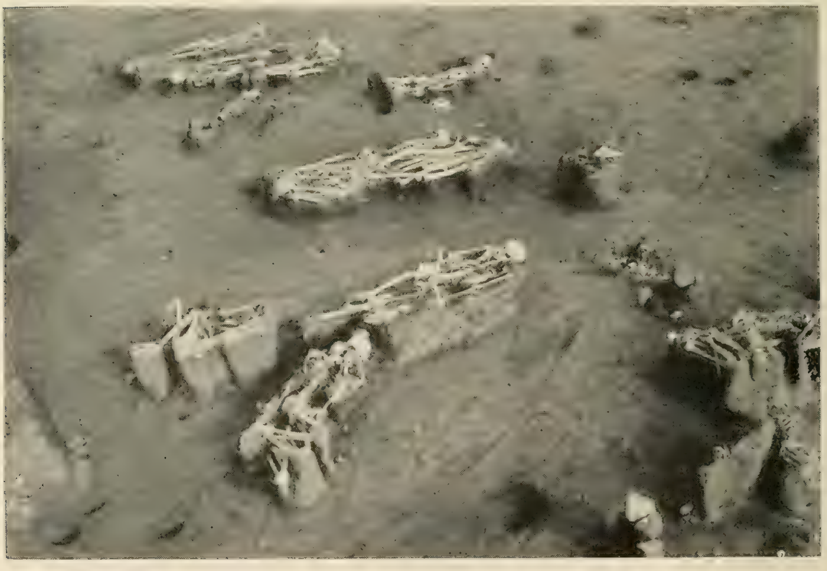
1. DRAWING RESTORATION OF POT. FOUND WITH BURIAL NO. 13. HEIGHT, 13 INCHES; MAXIMUM DIAMETER, 12.8 INCHES; MOUTH DIAMETER, 8.5 INCHES. SITE LU° 72.



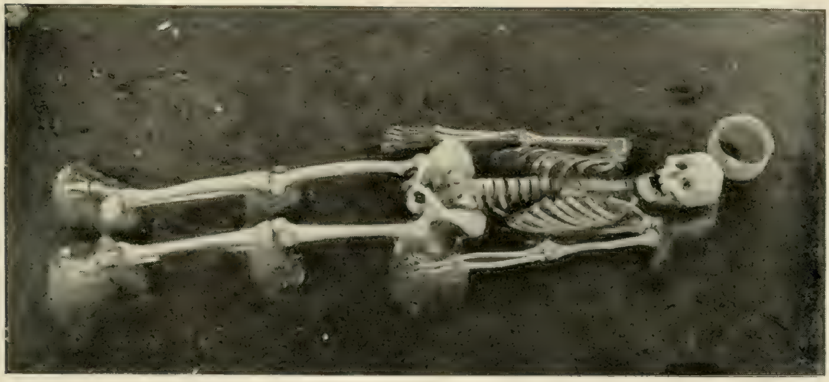
2. DRAWING REPRODUCTION OF POT. HEIGHT, 4.5 INCHES; MAXIMUM DIAMETER, 5.5 INCHES; MOUTH DIAMETER, 5 INCHES. SITE LU° 72.



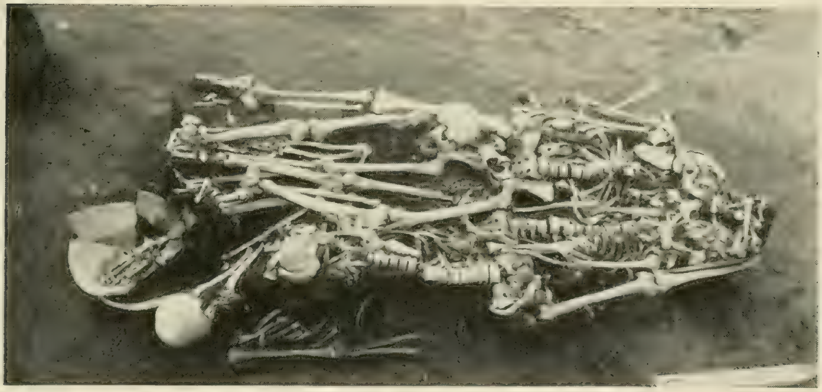
1. Village Site Excavated, From Southeast, Showing Nearly 100 Burials Exposed. Site Lu^v 92.



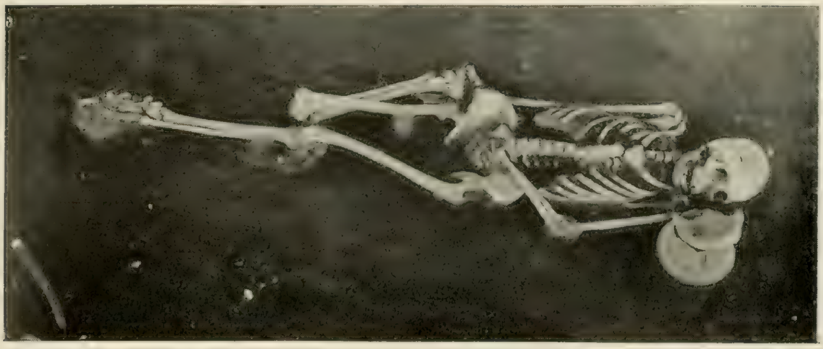
2. Looking Northwest. 23 Burials Exposed. Site Lu^v 92.



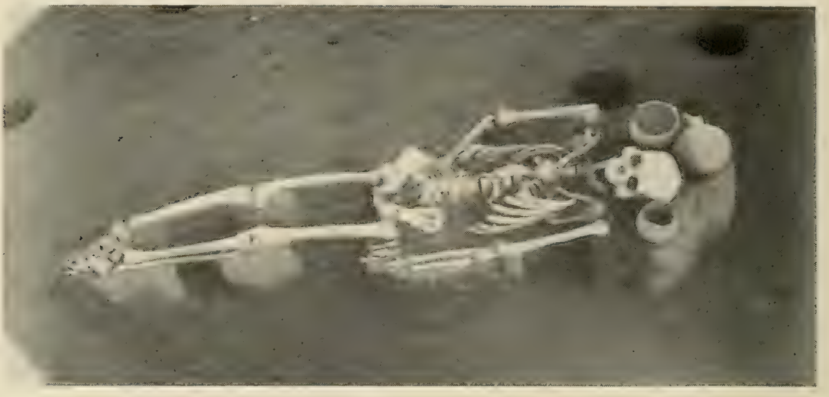
1. Burial No. 21 from South. Site Lu^v 92.



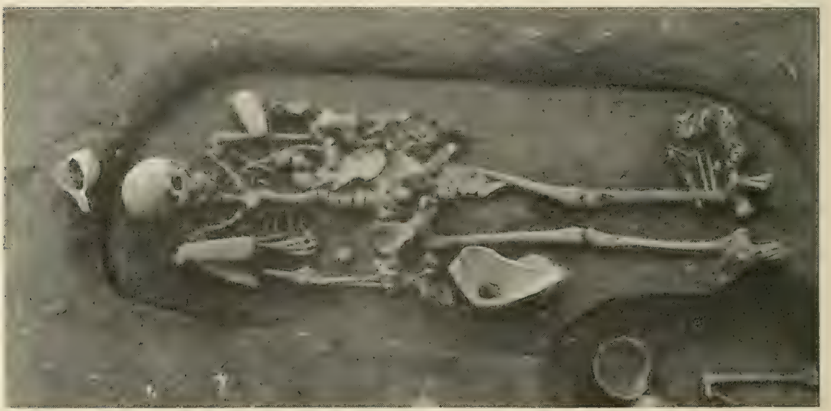
2. Burials Nos. 30, 31, 32, 33, and 34. Site Lu^v 92.



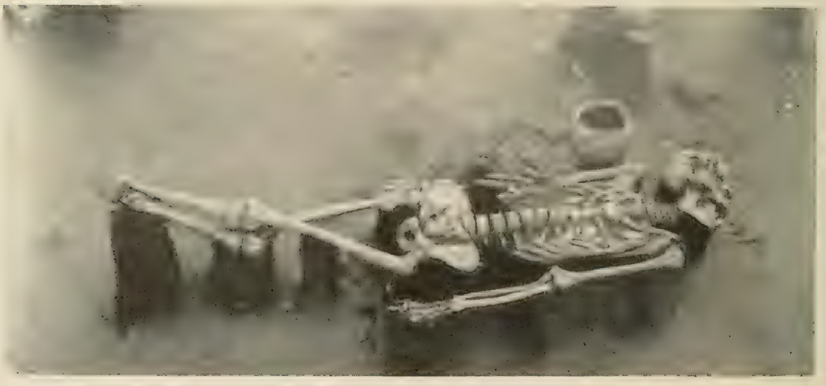
3. Burial No. 24. Site Lu^v 92.



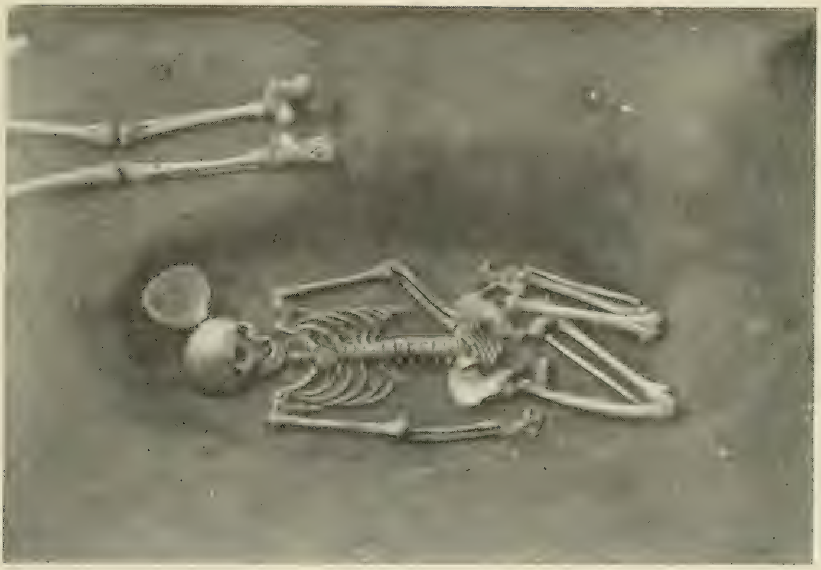
1. BURIAL NO. 22. SITE Lu^v 92.



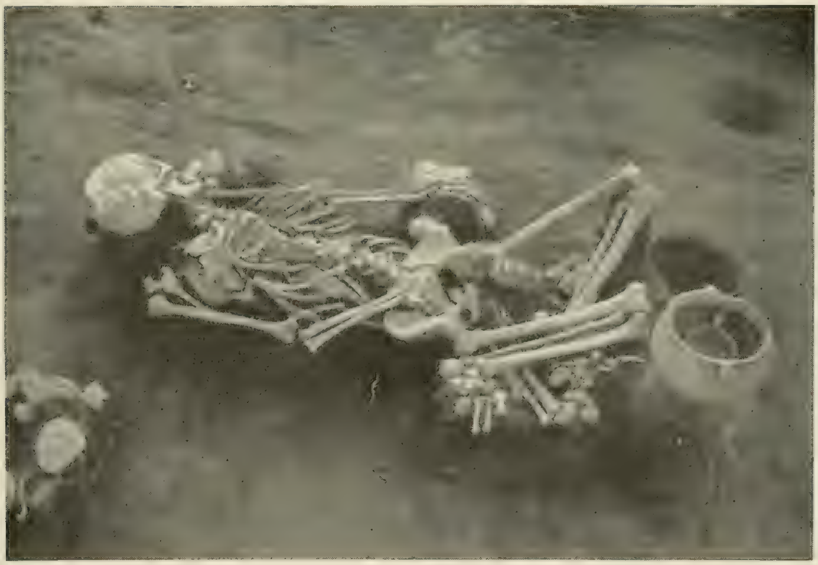
2. BURIAL NO. 23 WITH SOME 63 FIELD SPECIMENS. SITE Lu^v 92.



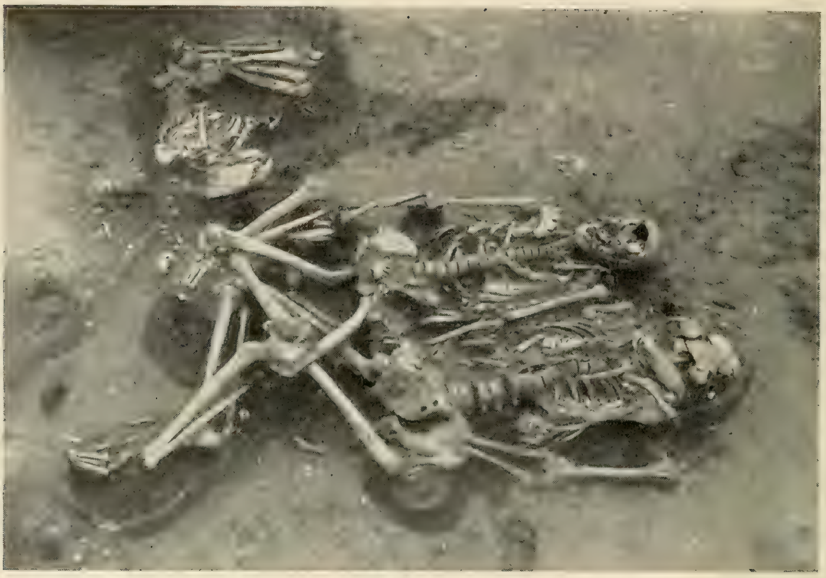
3. BURIAL NO. 70. SITE Lu^v 92.



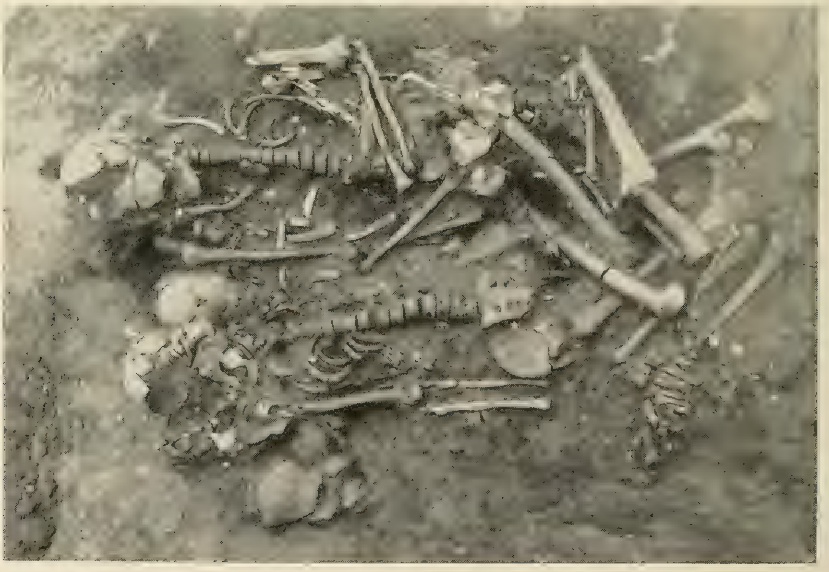
1. BURIAL NO. 25. SITE Lu^v 92.



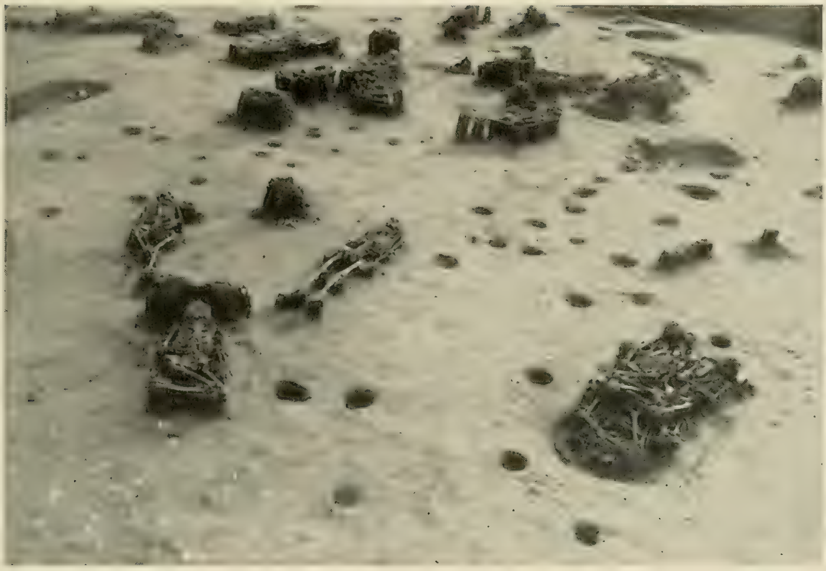
2. BURIAL NO. 26 ON TOP OF BURIALS NOS. 27, 28, 101, AND 102. SITE Lu^v 92.



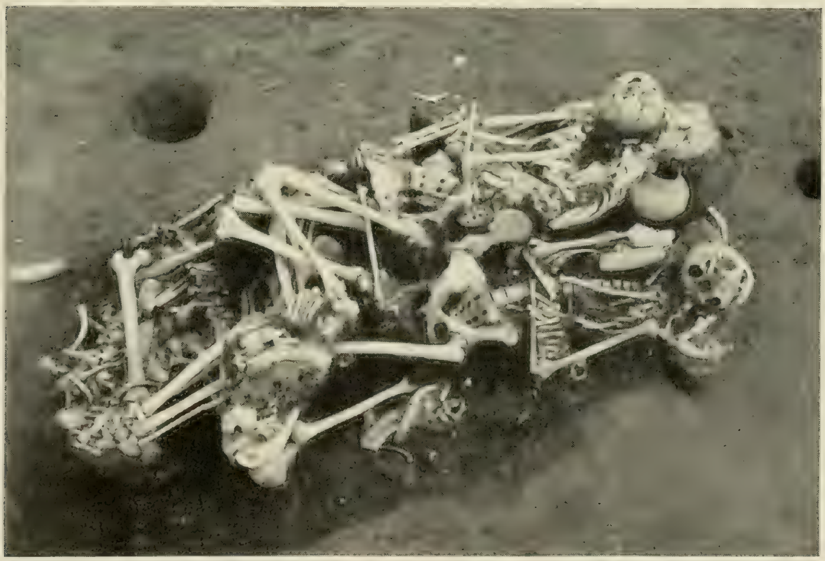
1. BURIALS NOS. 60 AND 61, AND NO 65 IN DISTANCE. SITE LUᵛ 92.



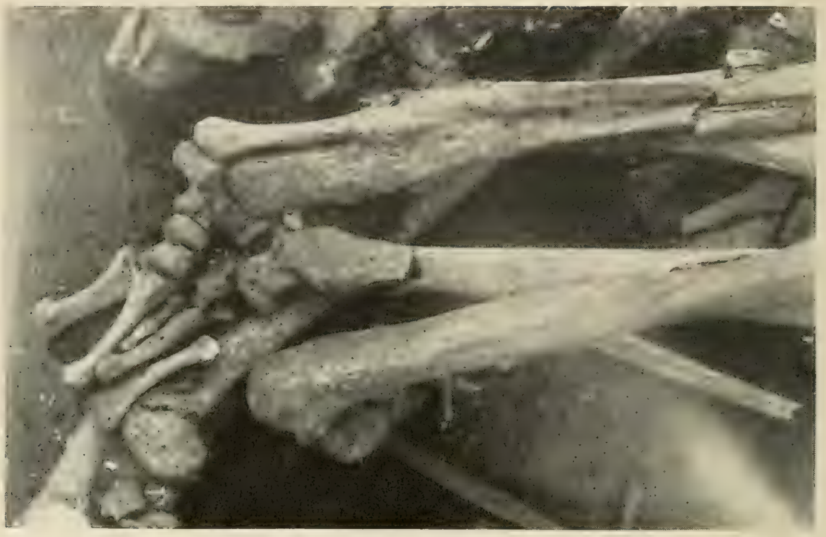
2. BURIALS NOS. 41, 42, AND 43. SITE LUᵛ 92.



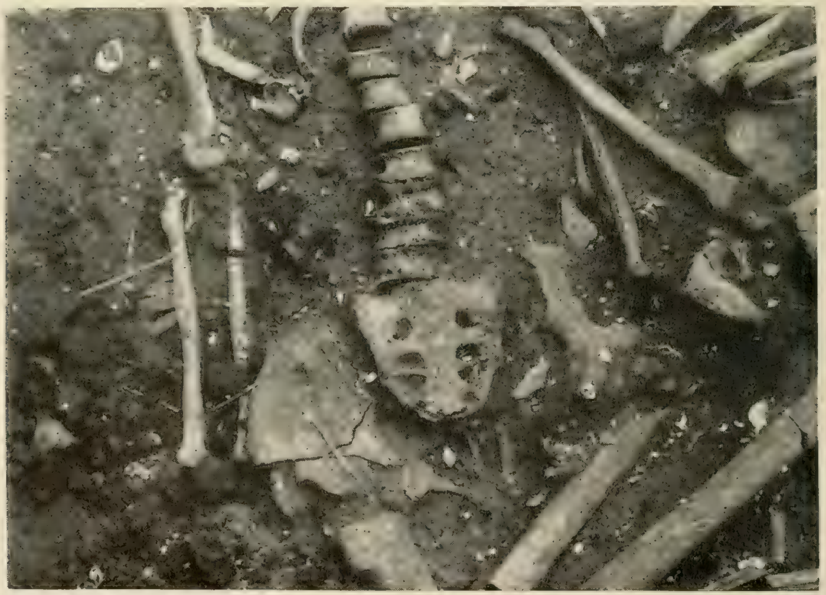
1. POST MOLDS IN VILLAGE SITE, LOOKING WEST. 50 BURIALS EXPOSED. SITE Lu^v 92.



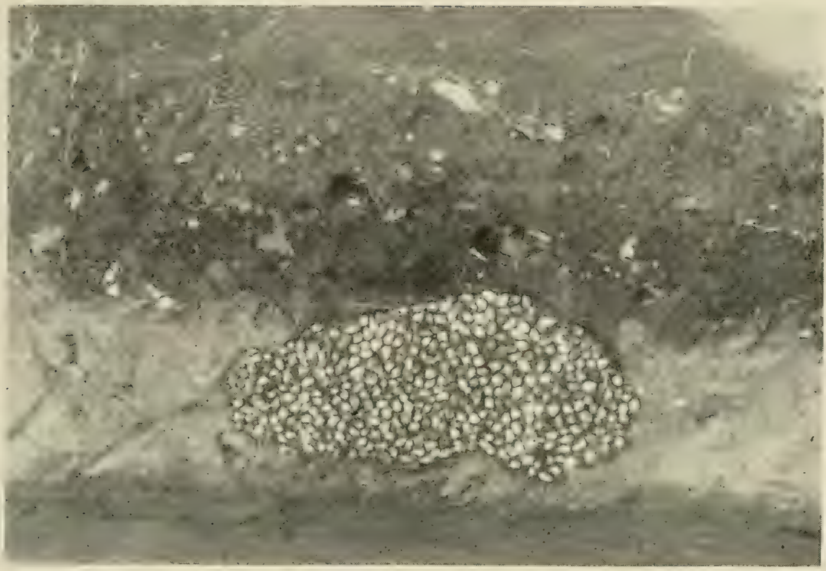
2. BURIALS NOS. 89, 90, 91, 92, 93, 94, 95, AND 96, WITH 20 FIELD SPECIMENS. SITE Lu^v 92.



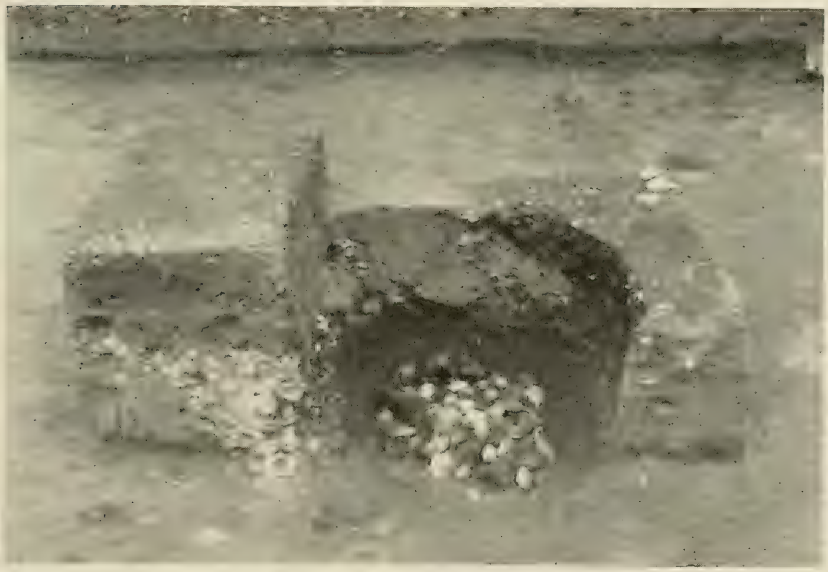
1. BURIAL NO. 66, SHOWING PATHOLOGY OF LEFT TIBIA AND FIBULA. SITE Luᵛ 92.



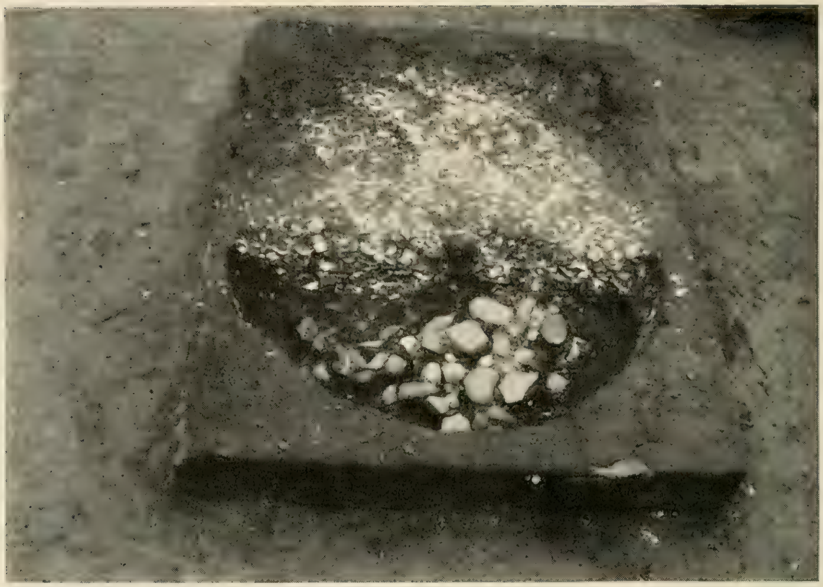
2. BURIAL NO. 43, SHOWING PATHOLOGY OF LUMBAR VERTEBRAE. SITE Luᵛ 92.



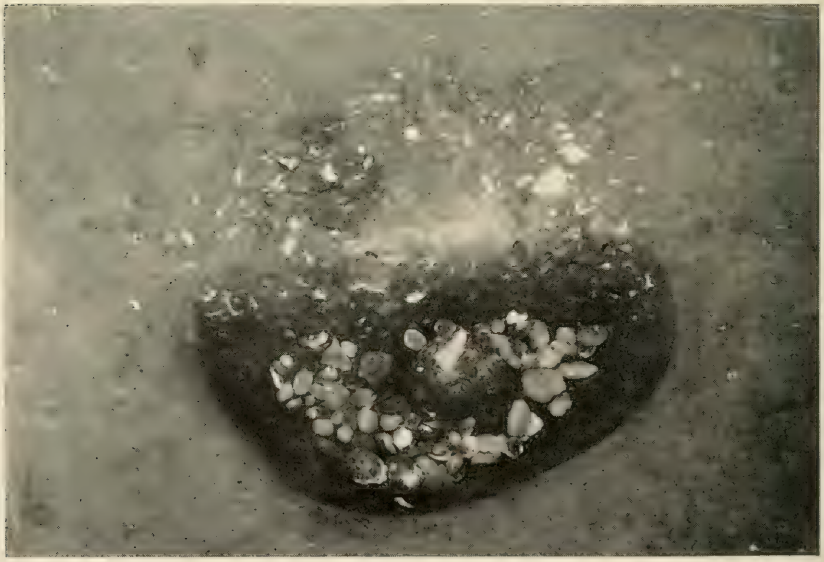
1. FEATURE NO. 14, A CACHE OF GASTROPODS. SITE LU^{v} 92.



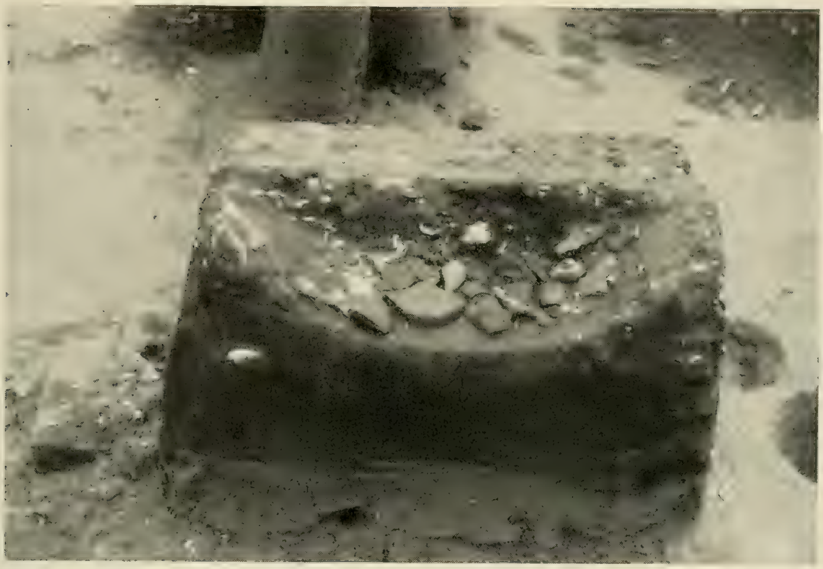
2. FEATURE NO. 6, CLAMBAKE OVEN. SITE LU^{v} 92.



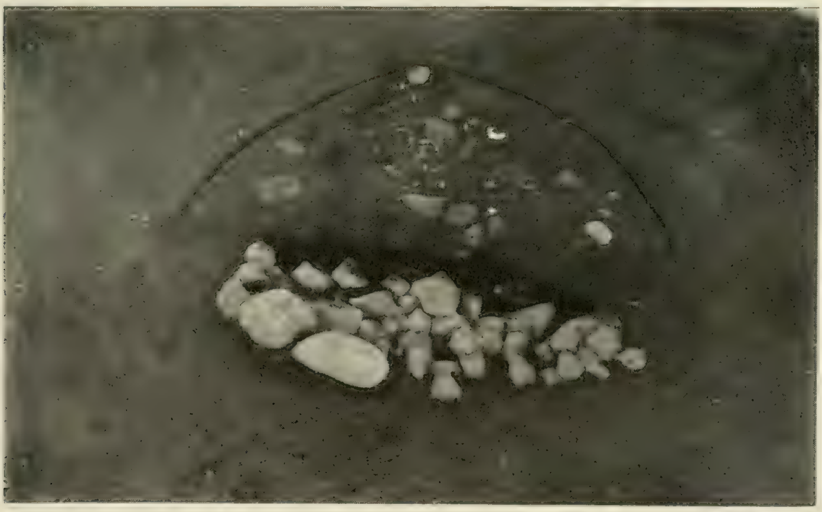
1. FEATURE NO. 7. CLAMBAKE PIT. SITE LU^{v} 92.



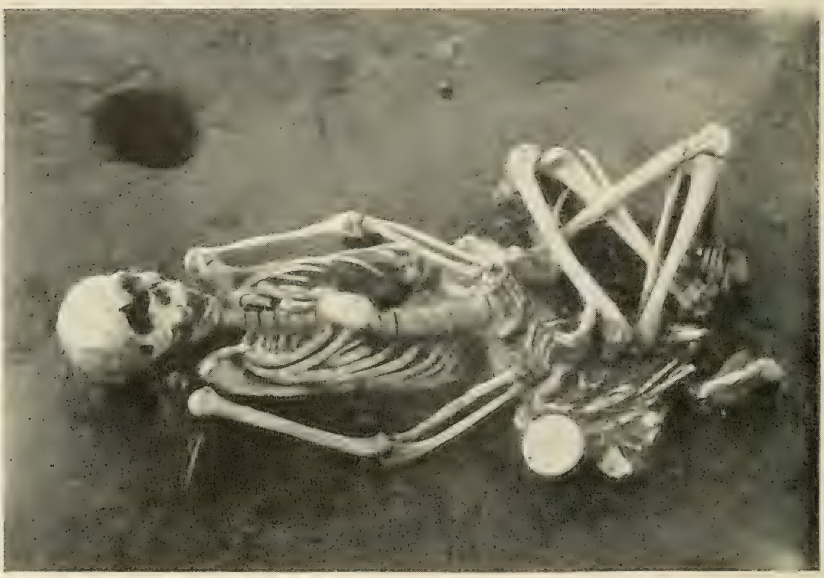
2. FEATURE NO. 8. SITE LU^{v} 92.



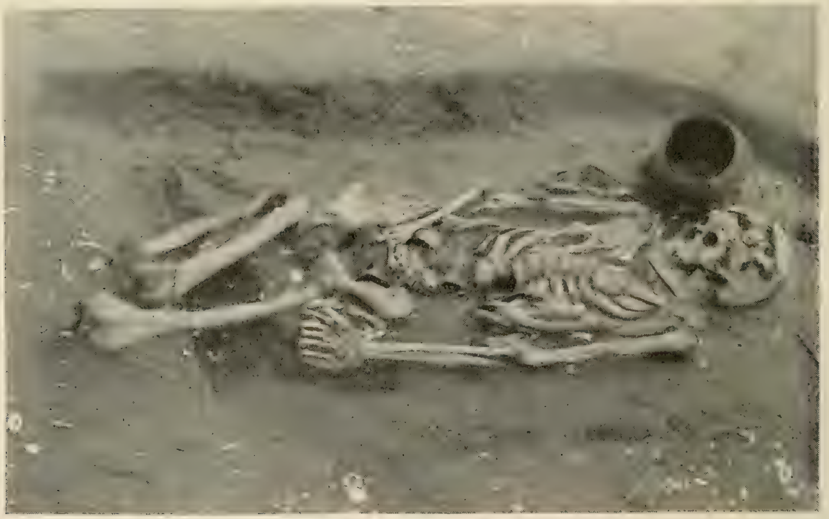
1. Feature No. 2, Fire Basin Containing Bones, Shell, and Potsherds. Site Lu^{v} 92.



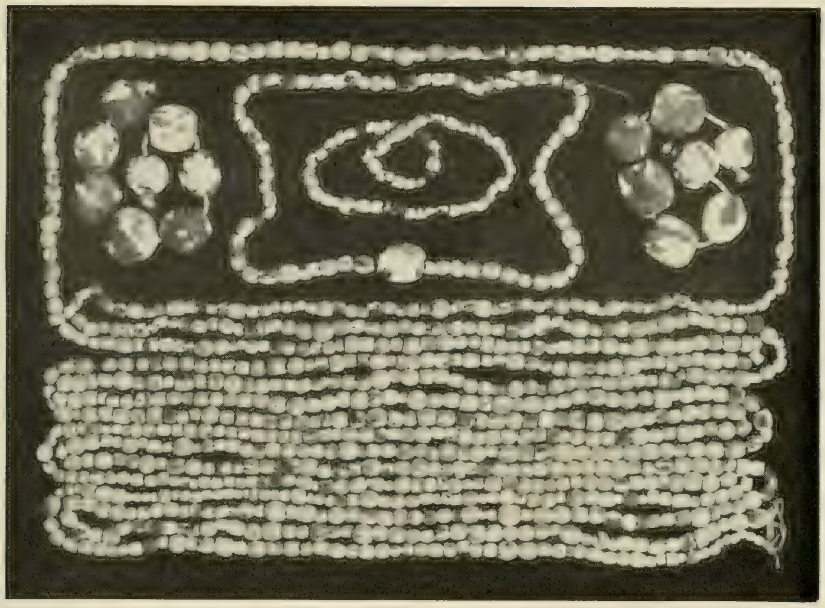
2. Feature No. 5, Fire Basin Filled With Fine Fractured Rock. Site Lu^{v} 92.



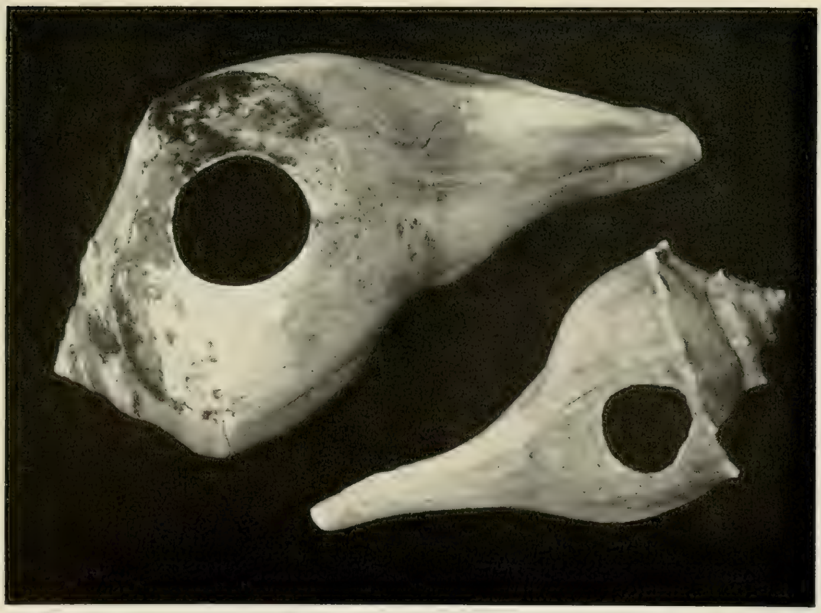
1. Burial No. 20, With Associations. Site Lu^v 92.



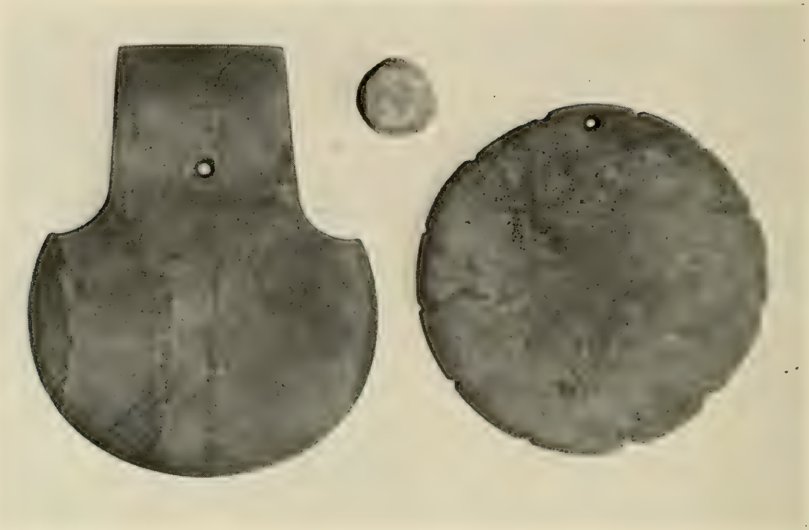
2. Burial No. 45, With Associations. Site Lu^v 92.



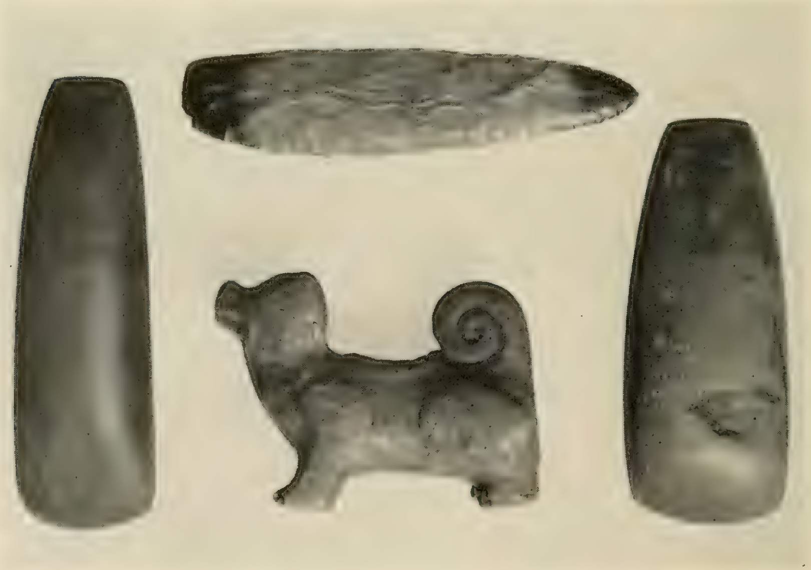
1. BEADS FROM BURIAL NO. 23; 958 BEADS IN ONE STRING. SITE LU^v 92.



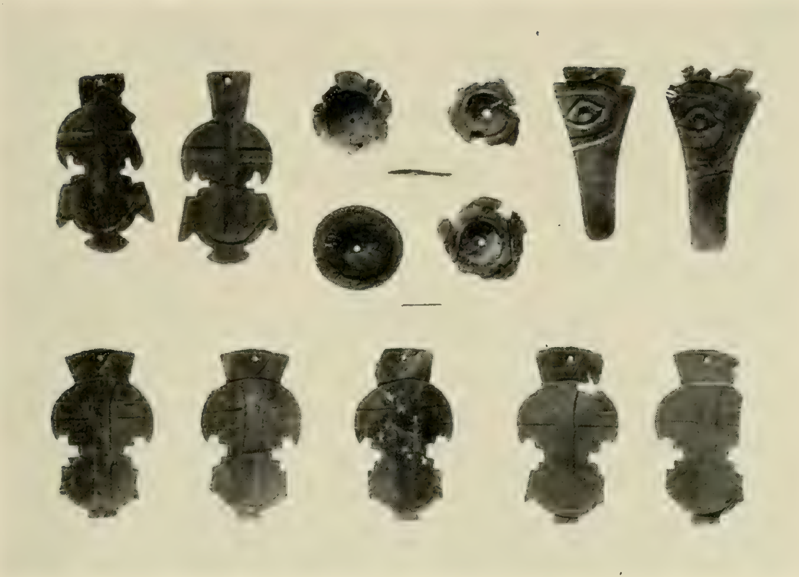
2. LARGE CONCH SHELLS CEREMONIALLY "KILLED." BURIAL NO. 23. SITE LU^v 92.



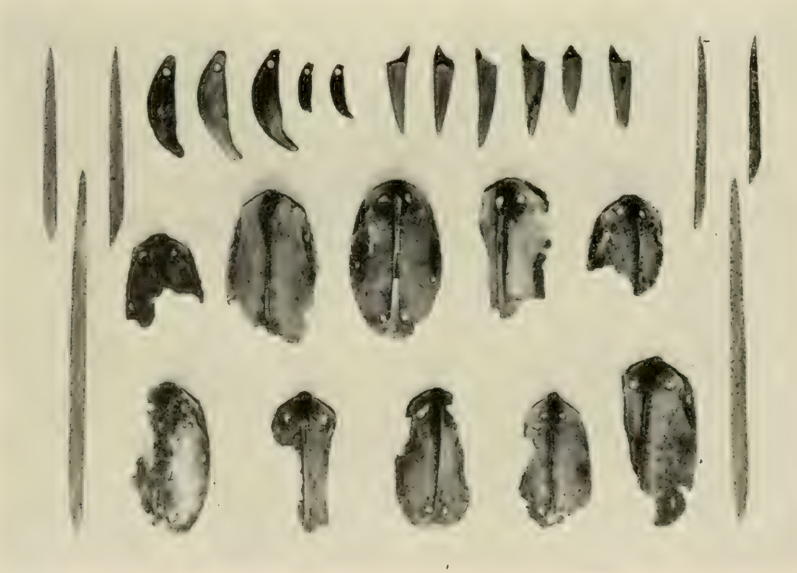
1. SPATULATE FORM OF "CEREMONIAL AX," SANDSTONE DISK, AND GALENA BALL. BURIAL NO. 23. SITE LU^{v} 92.



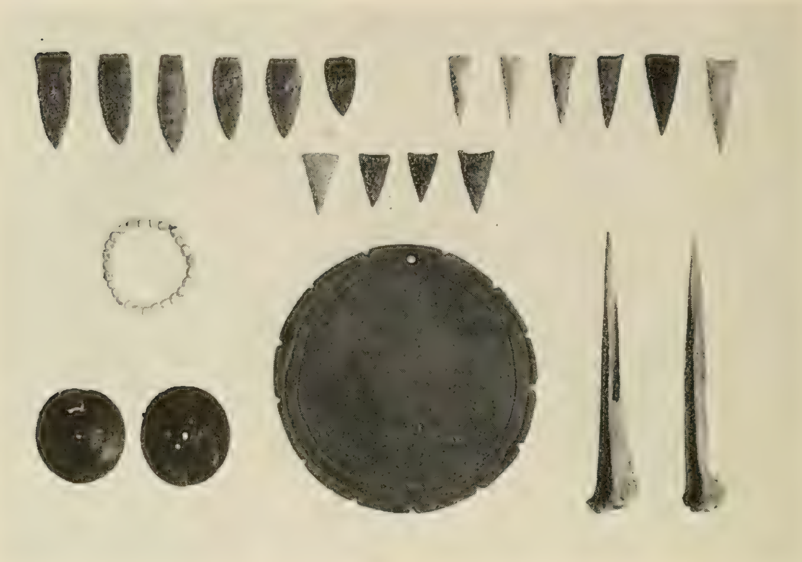
2. CELTS, FLINT KNIFE, AND EFFIGY PIPE. BURIAL NO. 23. SITE LU^{v} 92.



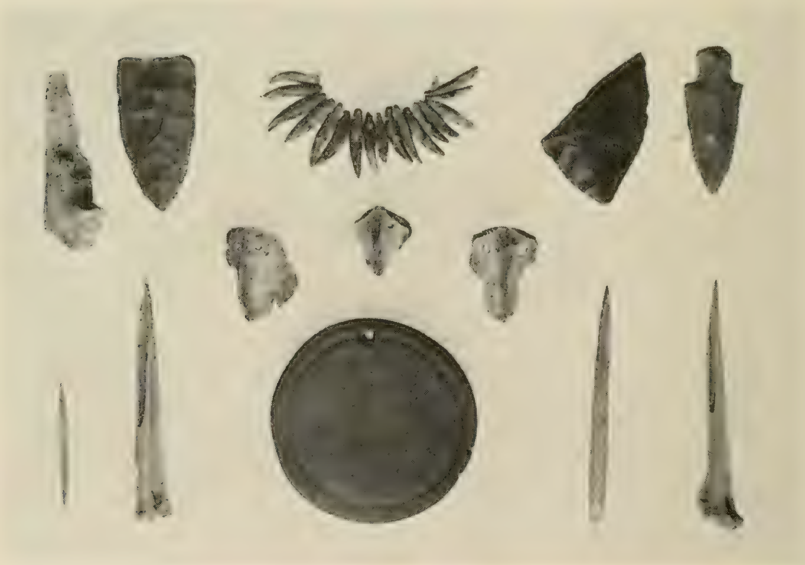
1. COPPER PENDANTS AND EAR ORNAMENTS. BURIAL NO. 23. SITE LUᵛ 92.



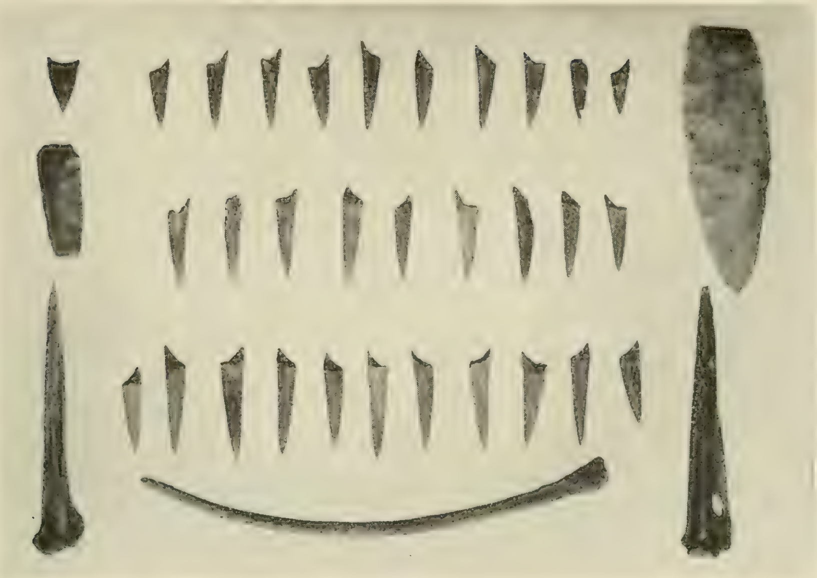
2. NEEDLE AWLS, DRILLED TEETH, ANTLER PROJECTILE POINTS, AND BIRD STERNUM PENDANTS. BURIAL NO. 23. SITE LUᵛ 92.



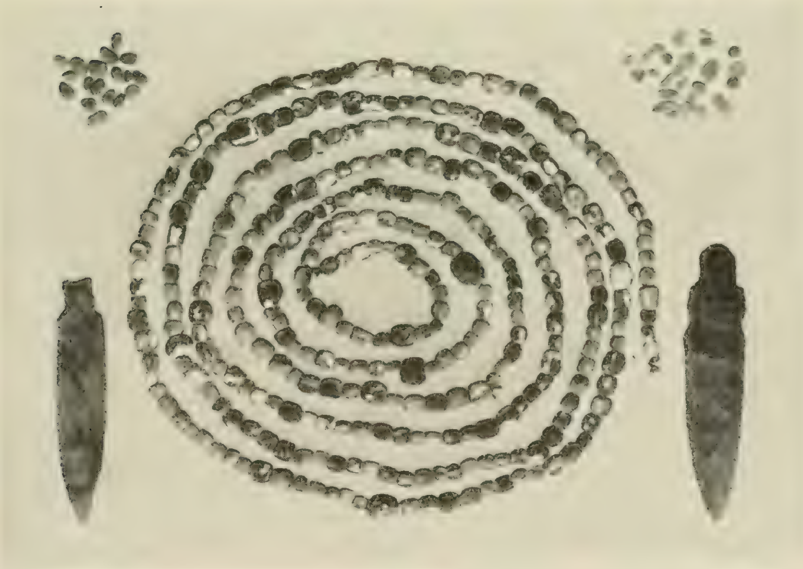
1. ASSOCIATED ARTIFACTS WITH BURIAL NO. 6. SITE Lu^v 92.



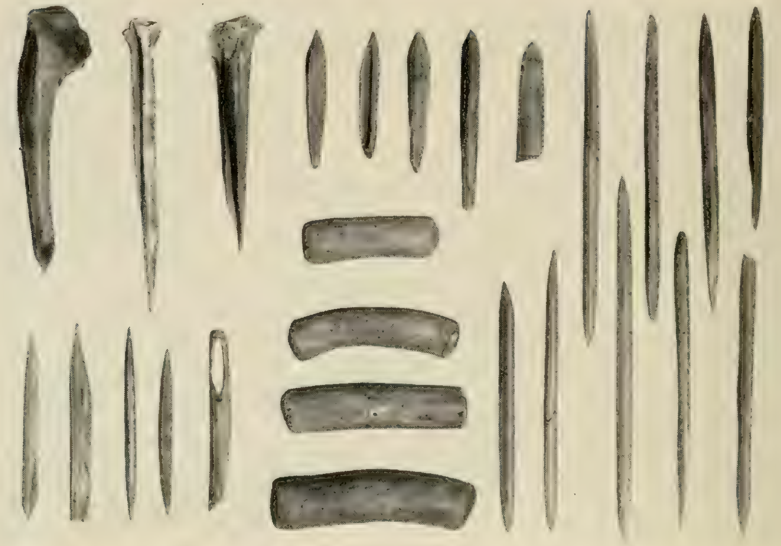
2. ASSOCIATED ARTIFACTS WITH BURIAL NO. 20. SITE Lu^v 92.



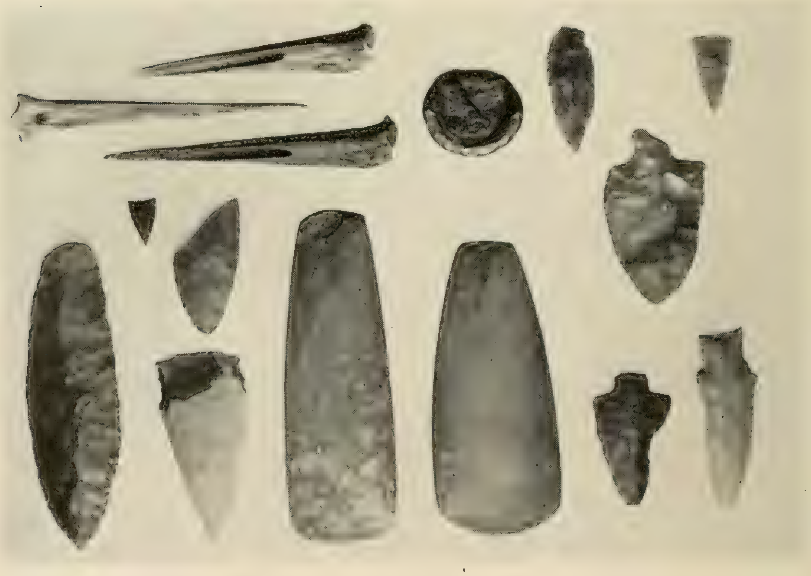
1. Associated Artifacts With Burial No. 91. Site Lu^v 92.



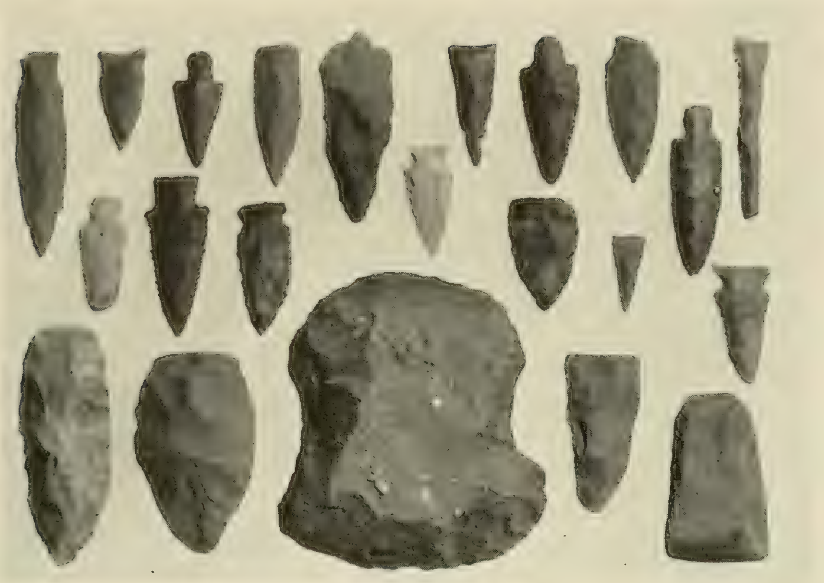
2. Associations With Multiple Burials Nos. 60 and 61. Site Lu^v 92.



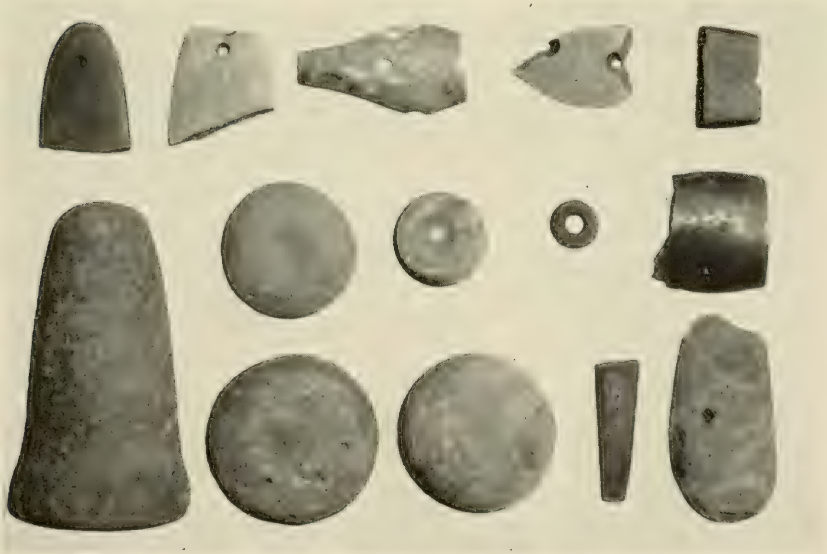
1. MISCELLANEOUS BONE ARTIFACTS. SITE Lu^v 92.



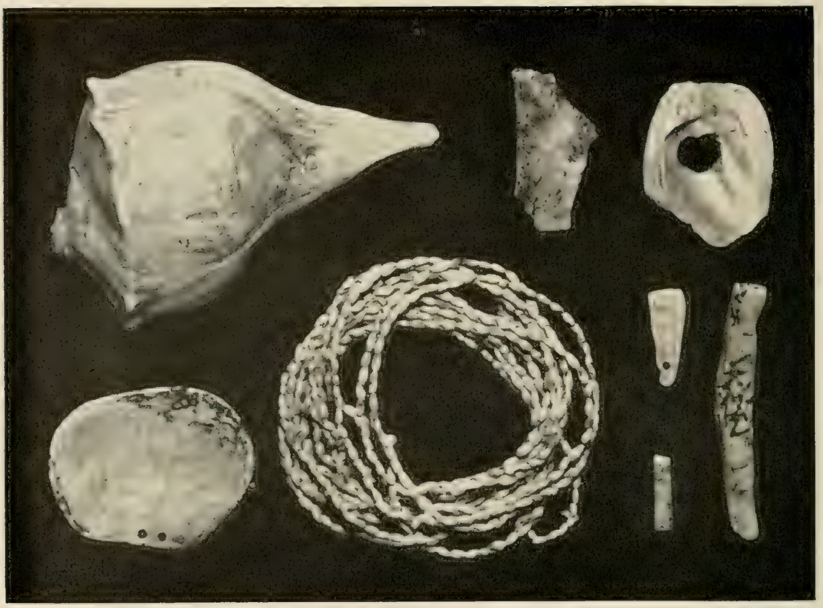
2. ASSOCIATIONS WITH MULTIPLE BURIALS NOS. 89 TO 96, AND BURIAL NO. 57.
SITE Lu^v 92.



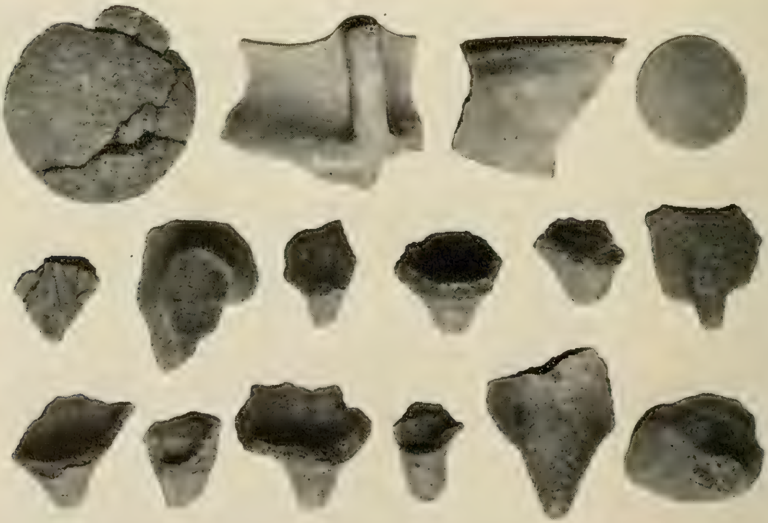
1. MISCELLANEOUS CHIPPED ARTIFACTS. SITE LU^{v} 92.



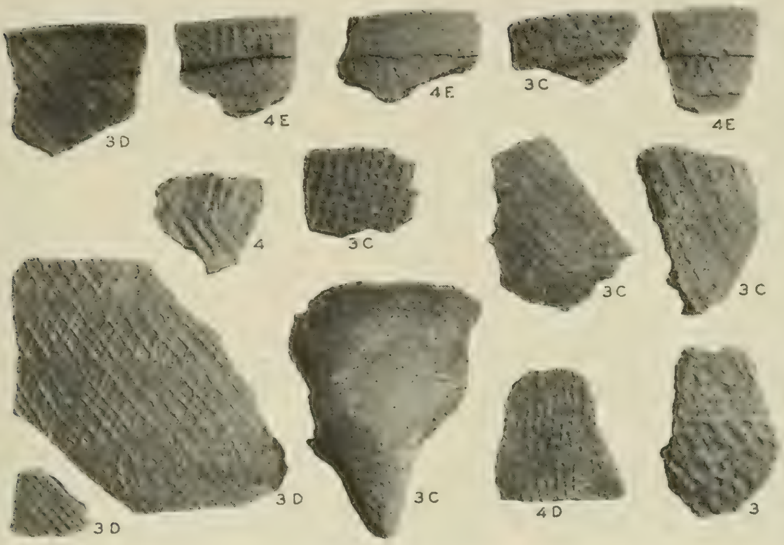
2. MISCELLANEOUS GROUND-STONE ARTIFACTS. SITE LU^{v} 92



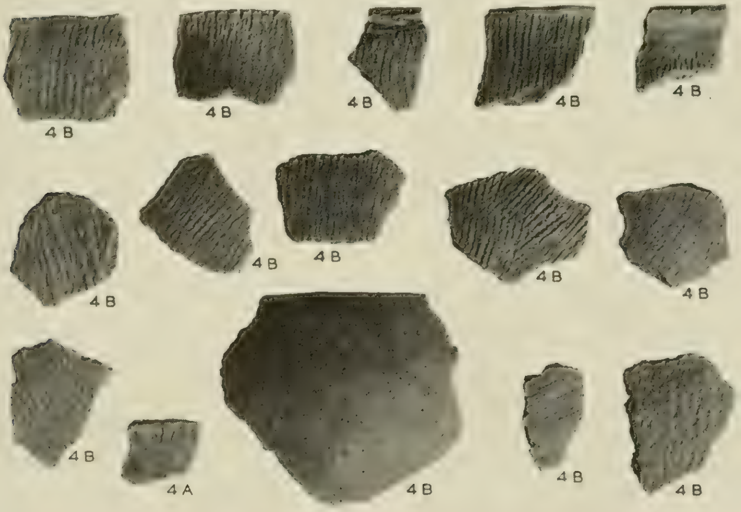
1. MISCELLANEOUS SHELL ARTIFACTS. SITE LU^v 92.



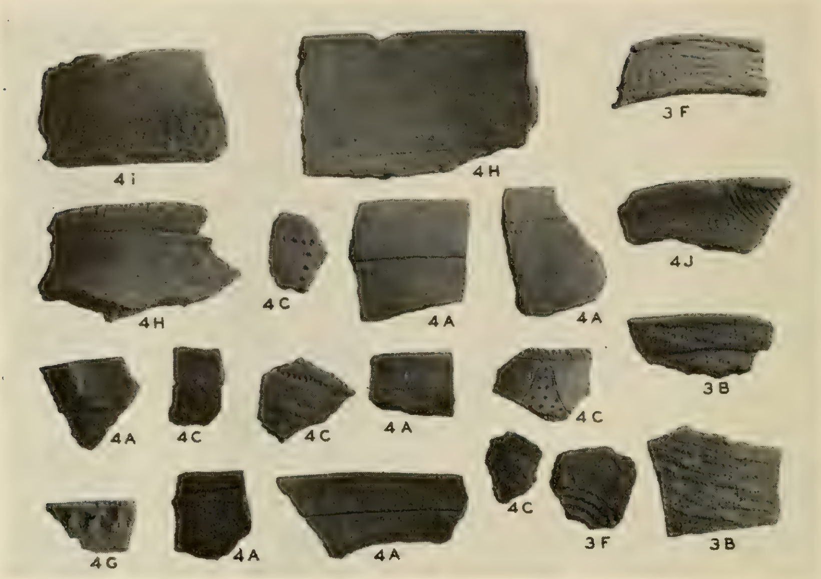
2. MISCELLANEOUS SHERDS, RIM, AND LEG FORMS. SITE LU^v 92.


3 D
4 E
4 E
3 C
4 E
4
3 C
3 C
3 C
3 D
3 C
4 D
3
3 D

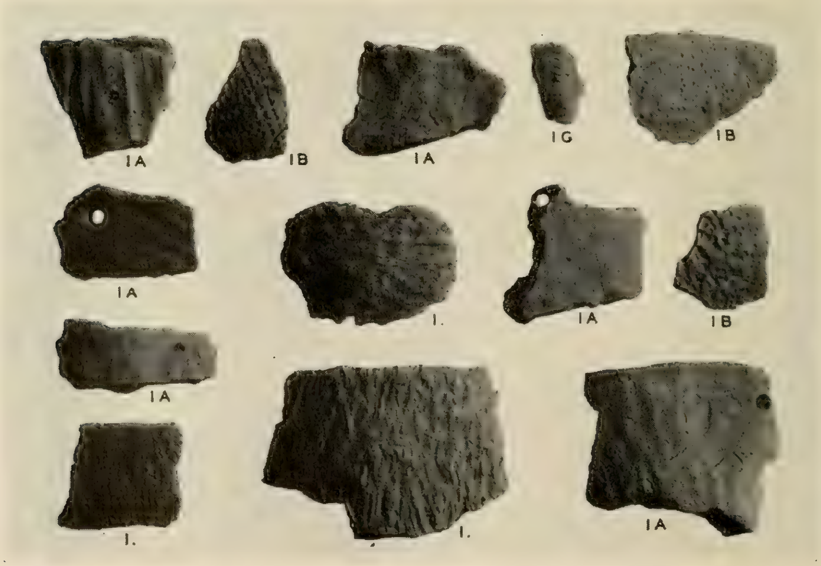
1. Sherds, Showing Check Stamp Ware on Limestone, and Clay-Grit-Tempered Wares. Site Lu^{v} 92.


4 B
4 B
4 B
4 B
4 B
4 B
4 B
4 B
4 B
4 B
4 B
4 A
4 B
4 B
4 B

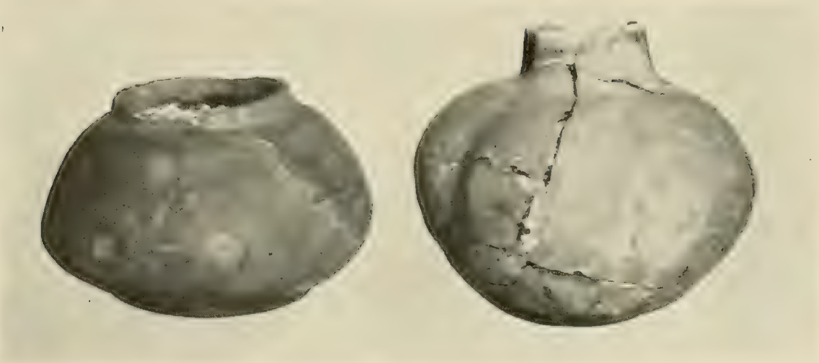
2. Clay-Grit, Paddle-Impressed Ware, Type 4B. Site Lu^{v} 92.


3 F
4 i
4 H
4 J
4 C
4 H
4 A
4 A
3 B
4 A
4 C
4 C
4 A
4 C
4 C
4 G
4 A
4 A
3 F
3 B

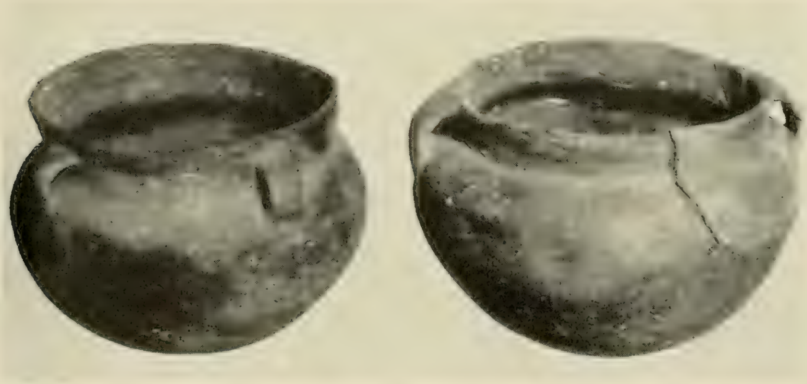
1. CLAY-GRIT- AND LIMESTONE-TEMPERED SHERDS. SITE LU^{v} 92.


1A
1B
1A
1G
1B
1A
1.
1A
1B
1A
1.
1.
1A

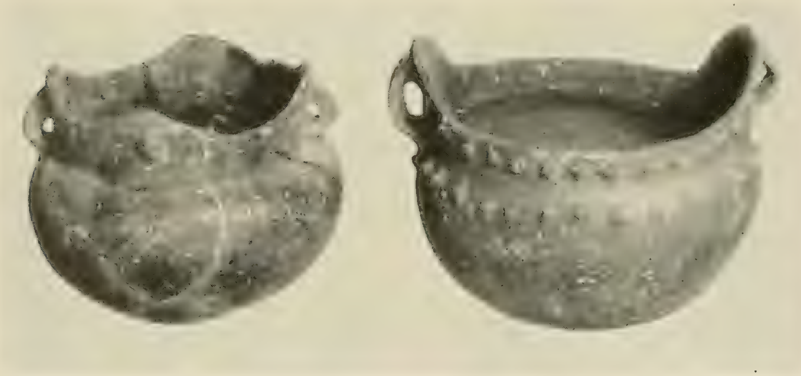
2. FIBER-TEMPERED WARE, TYPE 1. SITE LU^{v} 92.



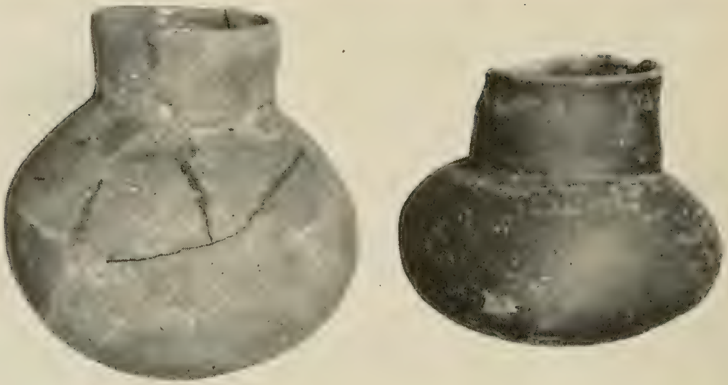
1. Left, Water Bottle From Burial No. 74; Right, Water Bottle From Burial No. 78. Site Lu^v 92.



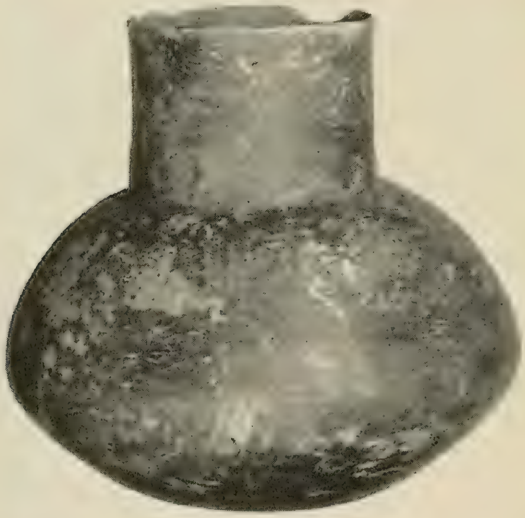
2. Pottery Vessels With Burial No. 45 and Multiple Burials Nos. 41–43. Site Lu^v 92.



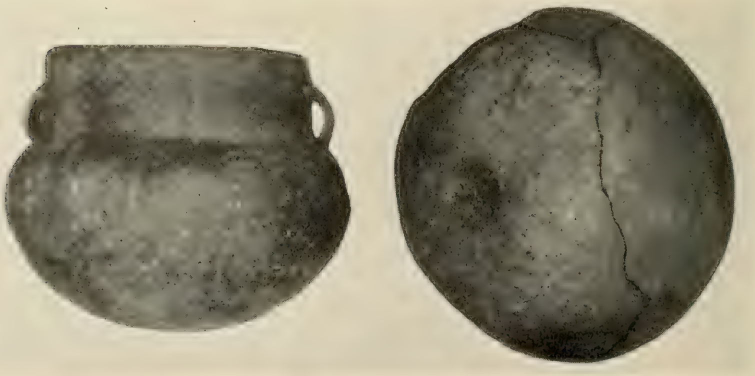
3. Pottery Vessels With Multiple Burials Nos. 41–43 and Burial No. 6. Site Lu^v 92.



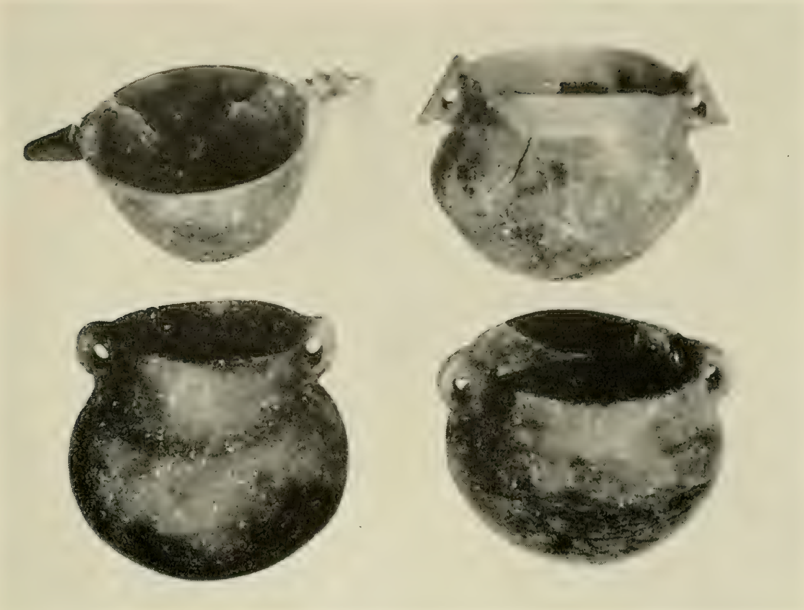
1. Water Bottles With Burial No. 66 and Burial No. 6. Site Lu^v 92.



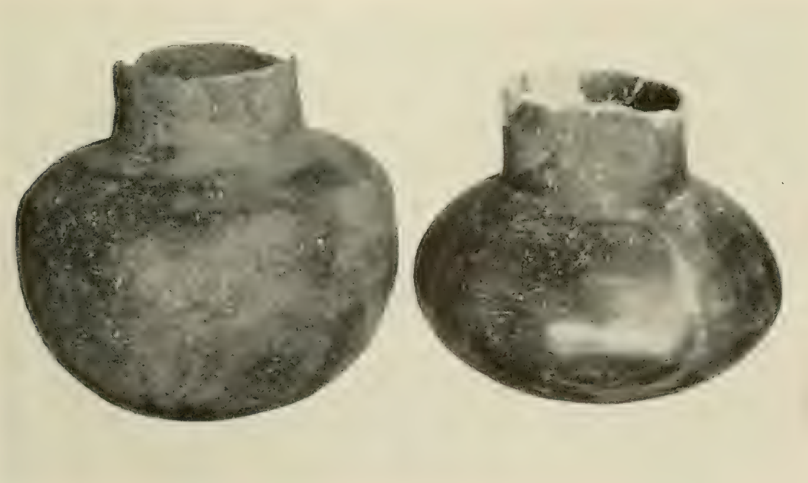
2. Water Bottle With Hand-Eye Design. Burial No. 79. Site Lu^v 92.



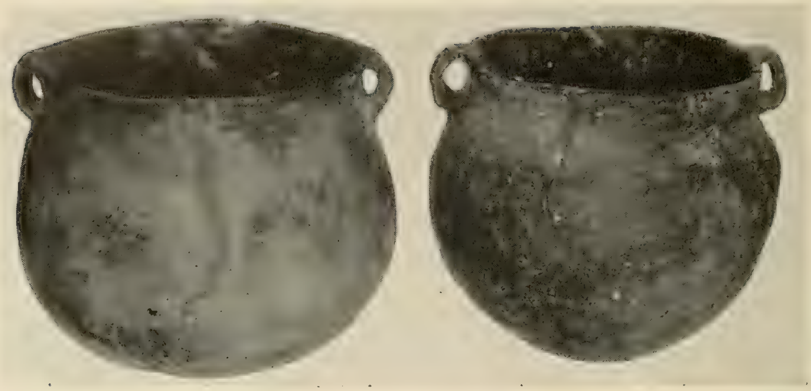
3. Pottery Vessels With Burial No. 4 and Burial No. 67. Site Lu^v 92.



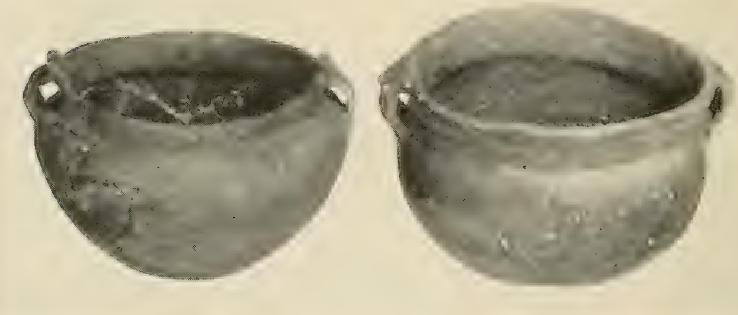
1. SMALL POTS FROM BURIALS NOS. 26, 41, 42, AND 43. SITE LU^{v} 92.



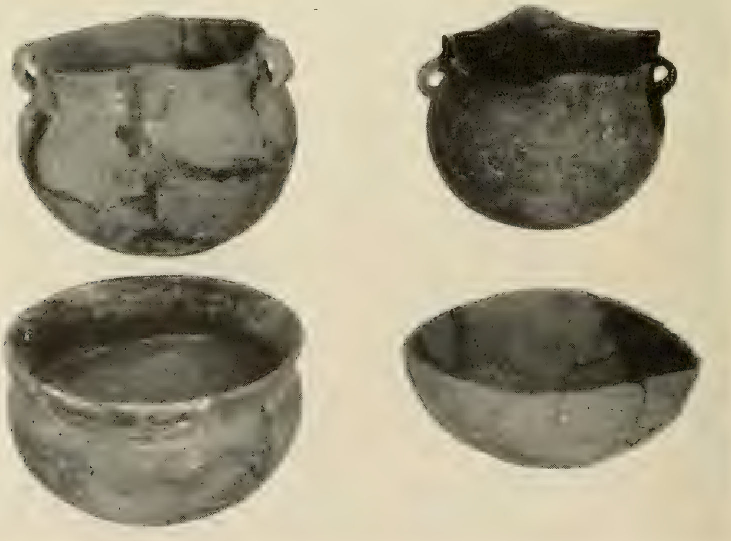
2. WATER BOTTLES FROM BURIALS NOS. 89 AND 6. SITE LU^{v} 92.



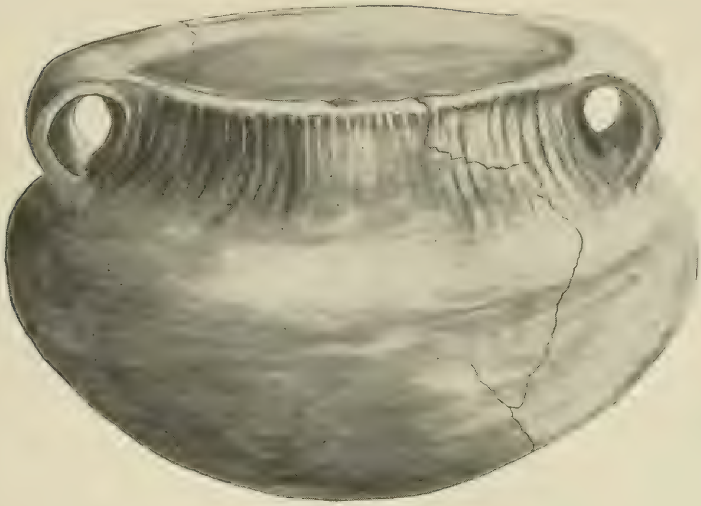
1. TWO-HANDLED POTS FROM BURIALS NOS. 45 AND 26. SITE LU^v 92.



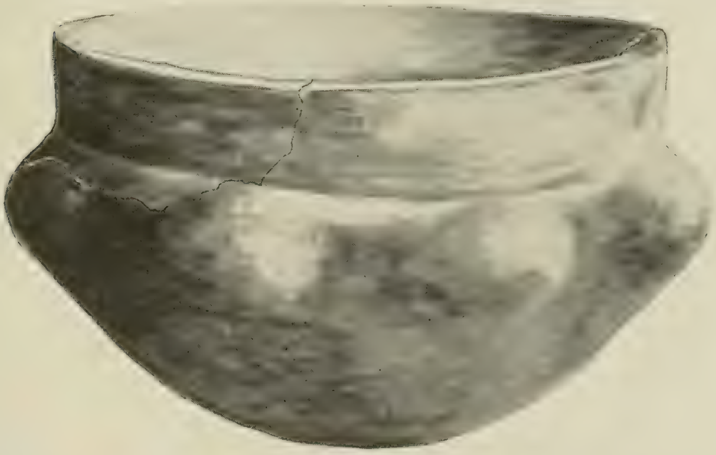
2. DECORATED, HANDLED POTS FROM BURIALS NOS. 21 AND 70. SITE LU^v 92.



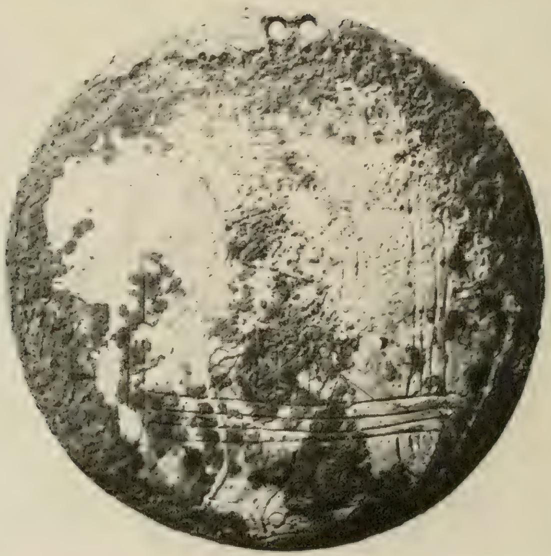
3. SMALL VESSELS FROM BURIALS NOS. 22, 6, 4, AND 41. SITE LU^v 92.



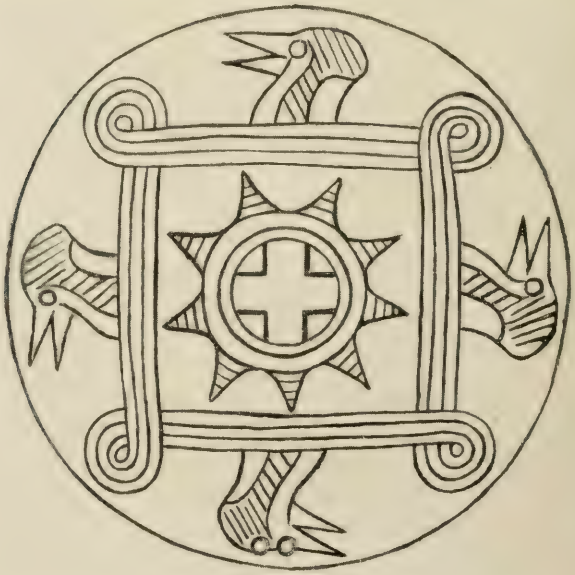
1. DRAWING RESTORATION OF POT WITH BURIAL NO. 23. HEIGHT, 4.2 INCHES; MAXIMUM DIAMETER, 6.5 INCHES; MOUTH DIAMETER, 4.25 INCHES. SITE Lu^{v}92.



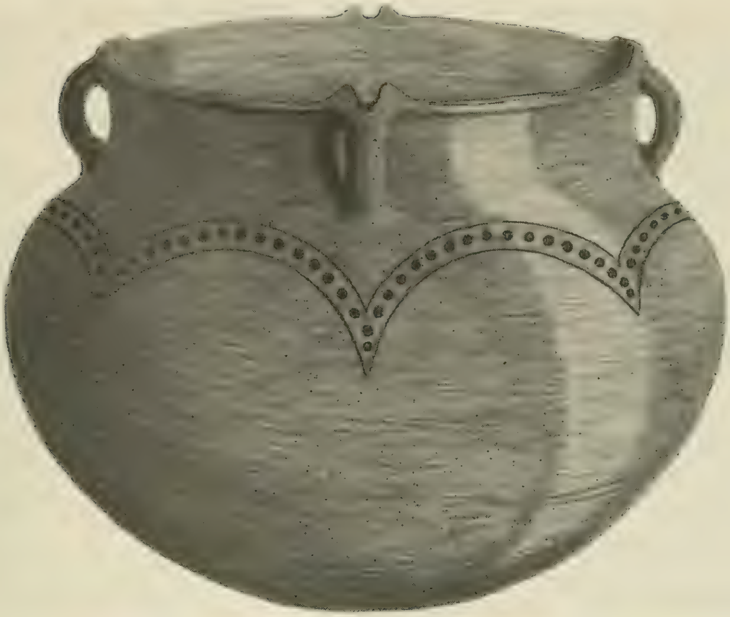
2. DRAWING RESTORATION OF POT WITH BURIAL NO. 24. HEIGHT, 4 INCHES; MAXIMUM DIAMETER, 7 INCHES; MOUTH DIAMETER, 6 INCHES. SITE Lu^{v} 92.



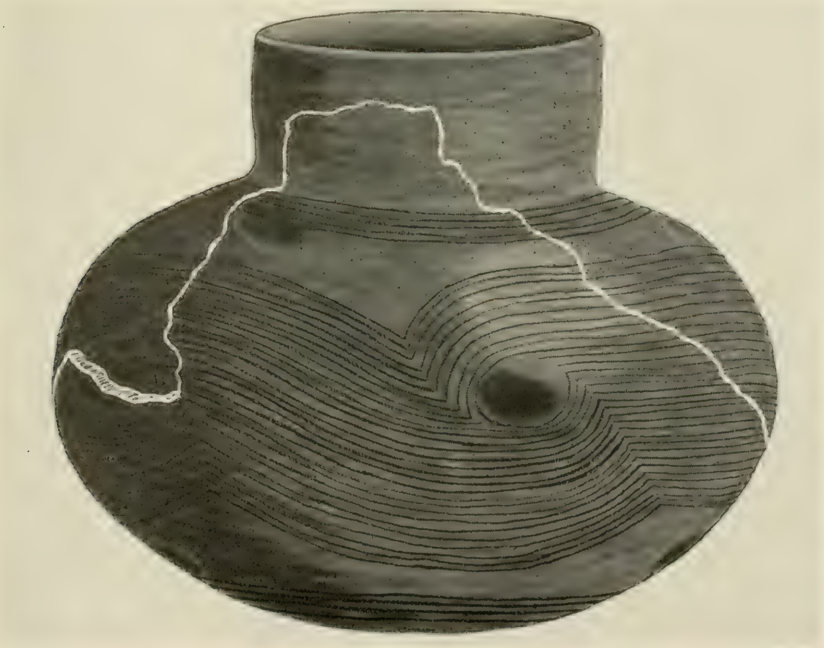
1. INCISED SHELL GORGET WITH MULTIPLE BURIALS NOS. 41, 42, AND 43. SITE Lu^v 92.



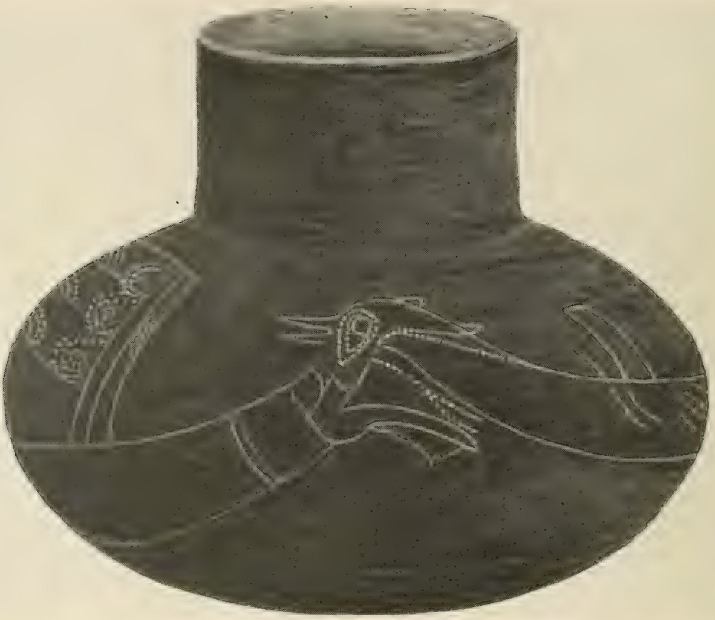
2. DRAWING OF FIGURE INCISED ON SHELL GORGET WITH BURIALS NOS. 41, 42, AND 43. SITE Lu^v 92.



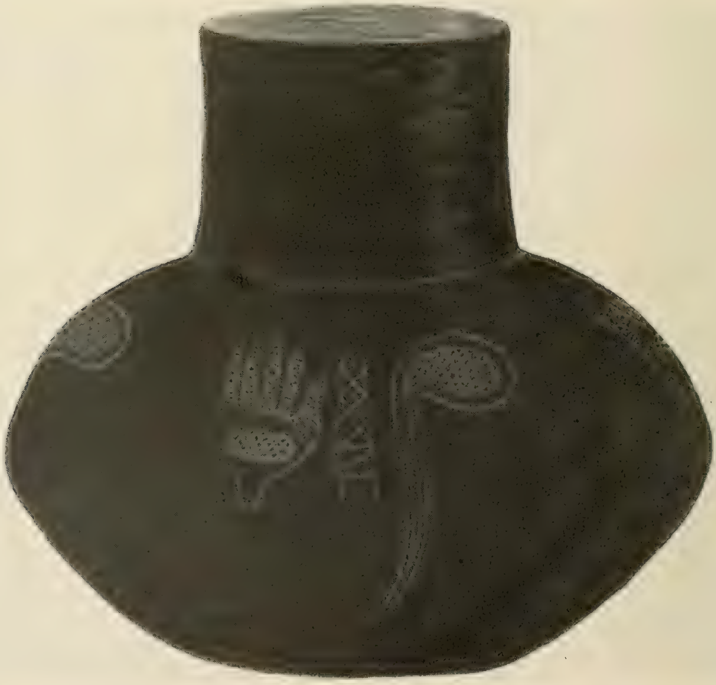
1. DRAWING RESTORATION OF POT WITH BURIALS NOS. 41, 42, AND 43. HEIGHT, 6.5 INCHES; MAXIMUM DIAMETER, 8.5 INCHES; MOUTH DIAMETER, 6.25 INCHES. SITE LU^{v} 92.



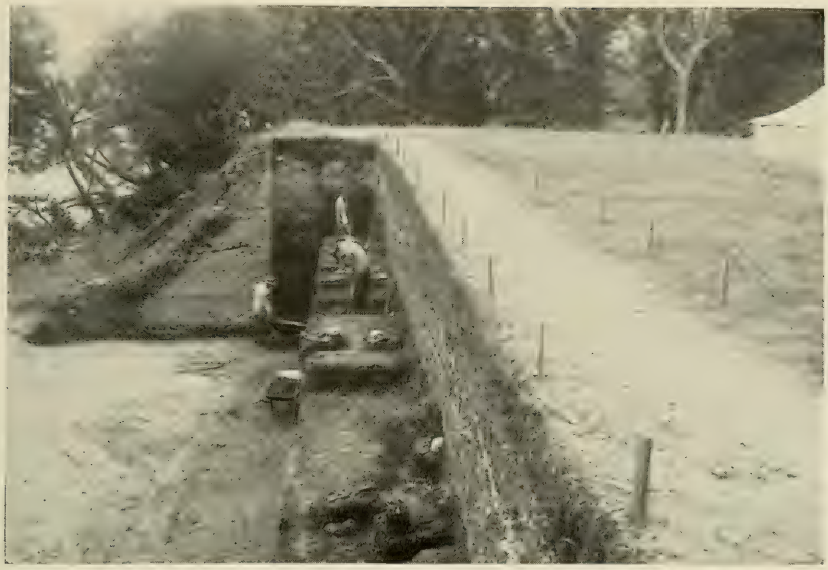
2. DRAWING RESTORATION OF A WATER BOTTLE FROM BURIAL NO. 74. HEIGHT, 5.25 INCHES; MAXIMUM DIAMETER, 6.25 INCHES, MOUTH DIAMETER, 3 INCHES. SITE LU^{v} 92.



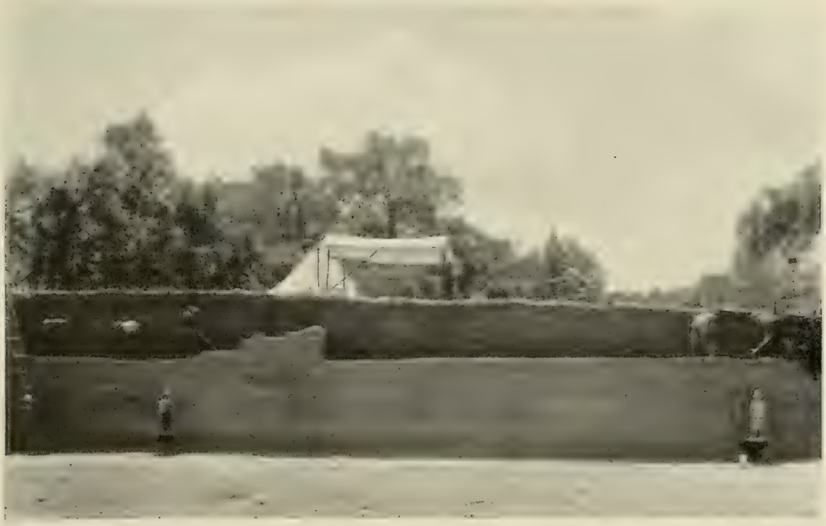
1. Drawing Restoration of Engraved Water Bottle From Burial No. 6 Height, 6.25 Inches; Maximum Diameter, 7.5 Inches; Mouth Diameter, 3.5 Inches. Site Lu^v 92.



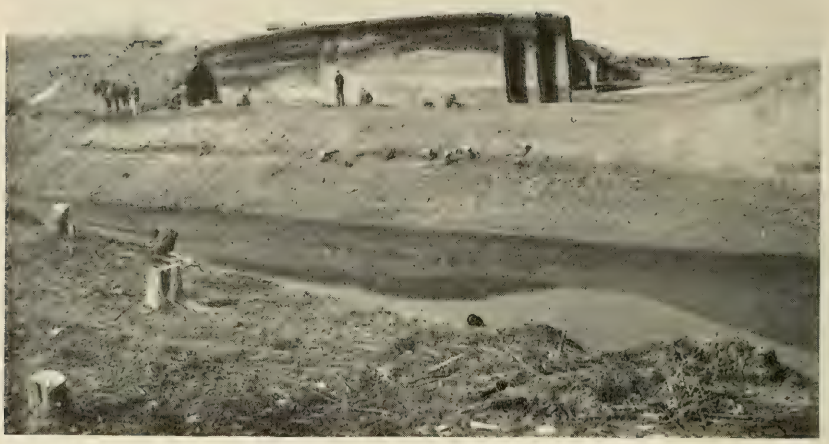
2. Drawing Restoration of Water Bottle From Burial No. 79. Height, 7 Inches; Maximum Width, 7.5 Inches; Mouth Diameter, 3.5 Inches. Site Lu^v 92.



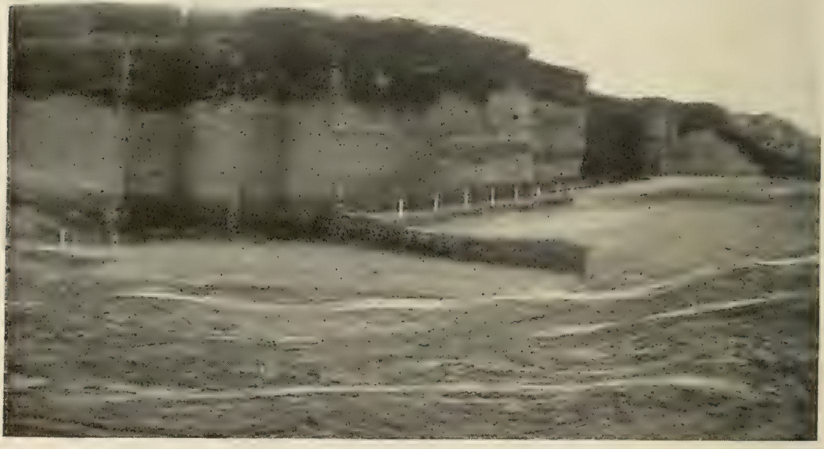
1. 15-Foot Profile Half Exposed. Mouth of Mulberry Creek in Distance. Site Ct° 27.



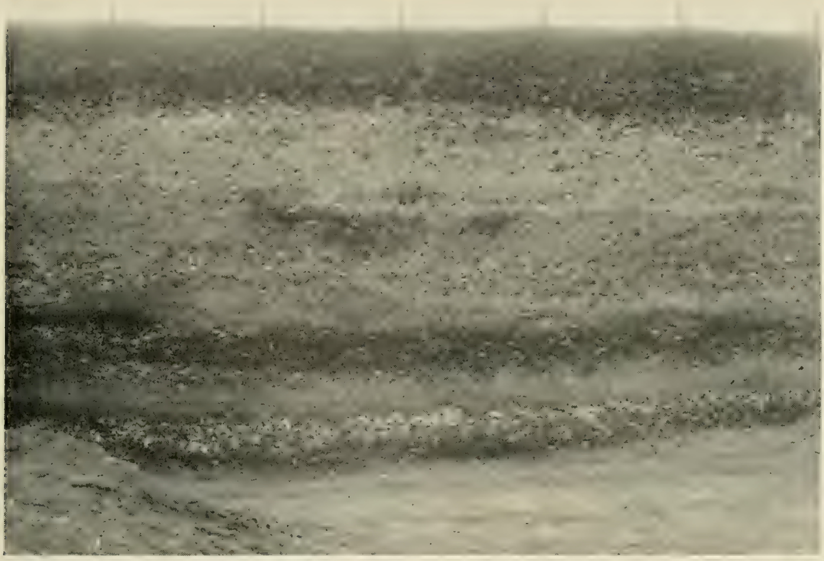
2. North Profile, 17 Feet Deep Facing River. Site Ct° 27.



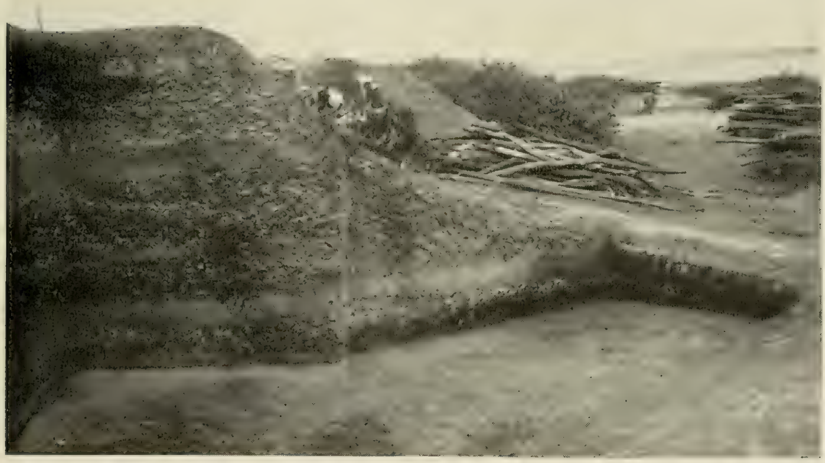
1. EAST PROFILE, LOOKING ACROSS MULBERRY CREEK. SITE CT° 27.



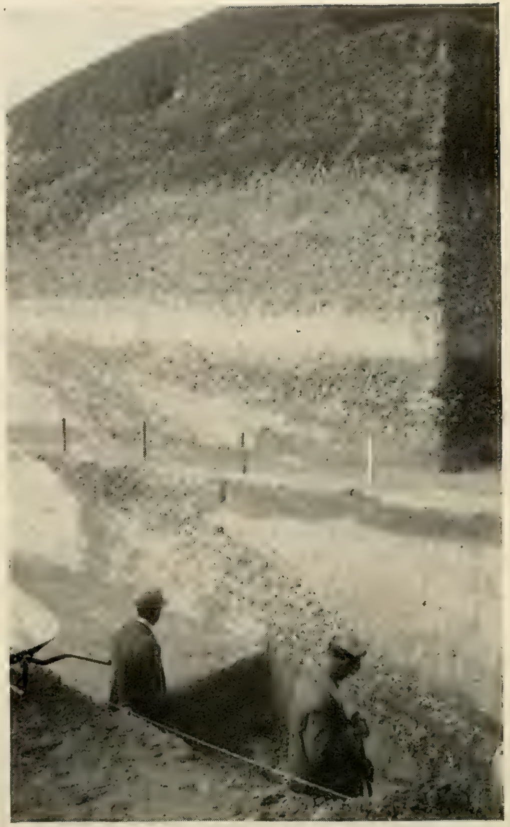
2. CLOSE-UP, CORNER OF EAST AND NORTH PROFILES. SITE CT° 27.



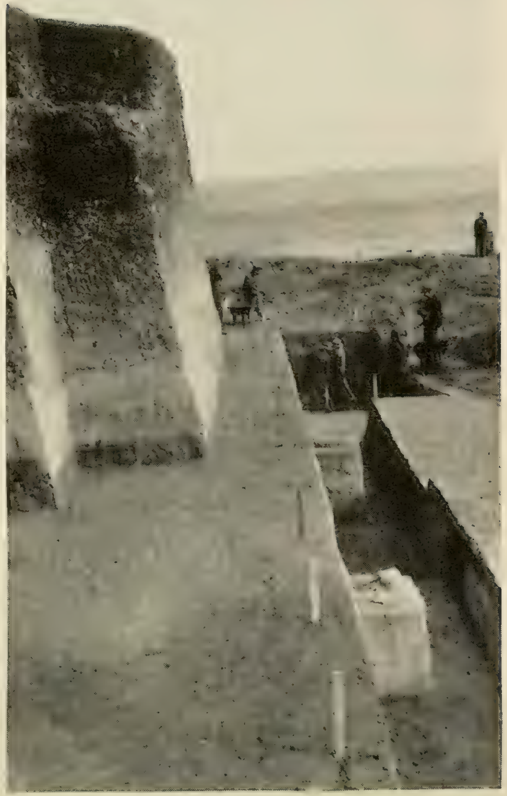
1. CLOSE-UP OF 15-FOOT PROFILE, NORTH FACE. SITE CT° 27.



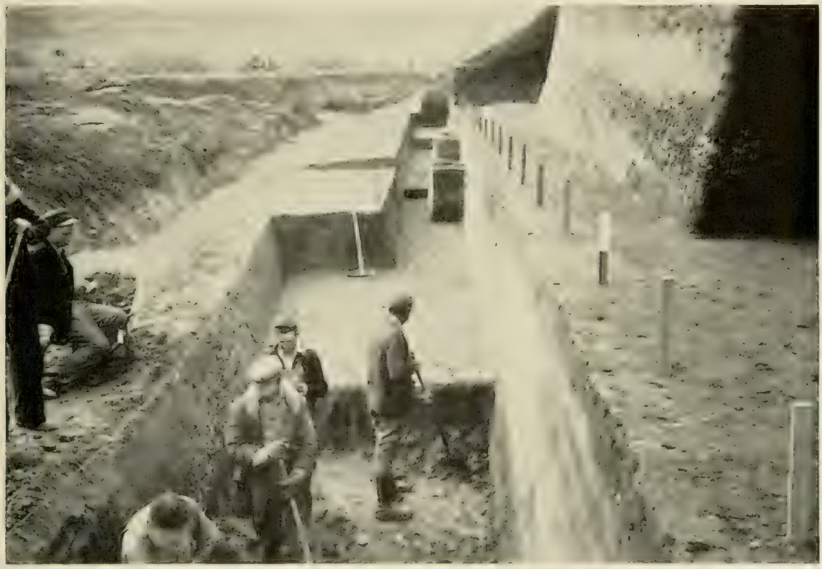
2. EDGE OF EXCAVATION, LOOKING DOWNSTREAM. SITE CT° 27.



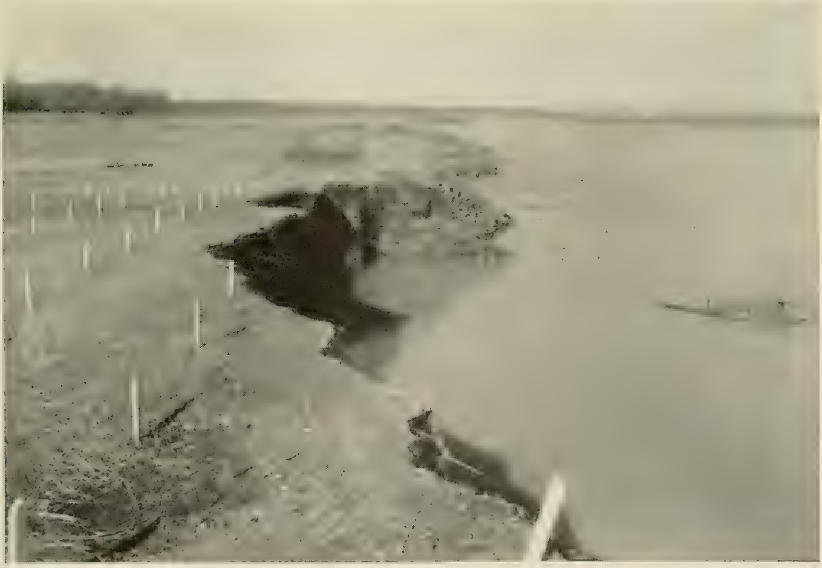
1. EAST PROFILE, SHOWING SHARPLY DIPPING SHELL LAYER. SITE CT° 27.



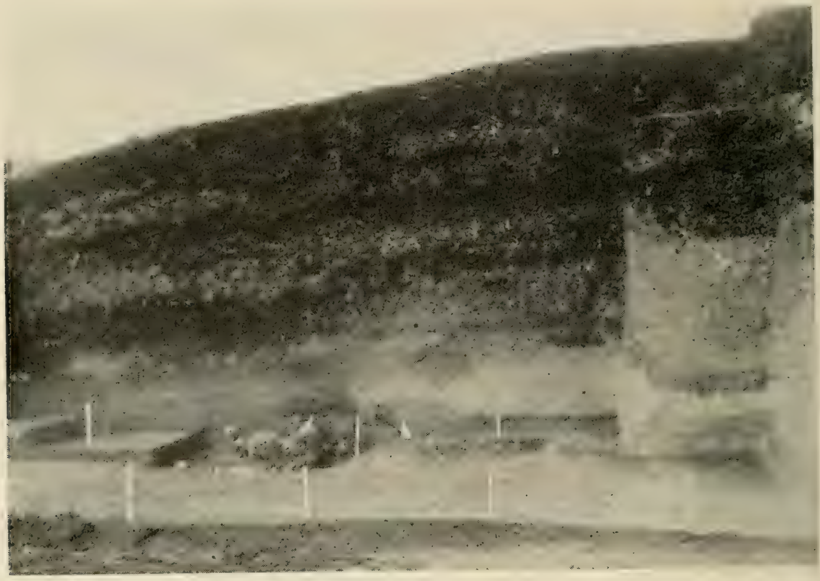
2. TRENCH ON EAST PROFILE, LOOKING TOWARD RIVER. SITE CT° 27.



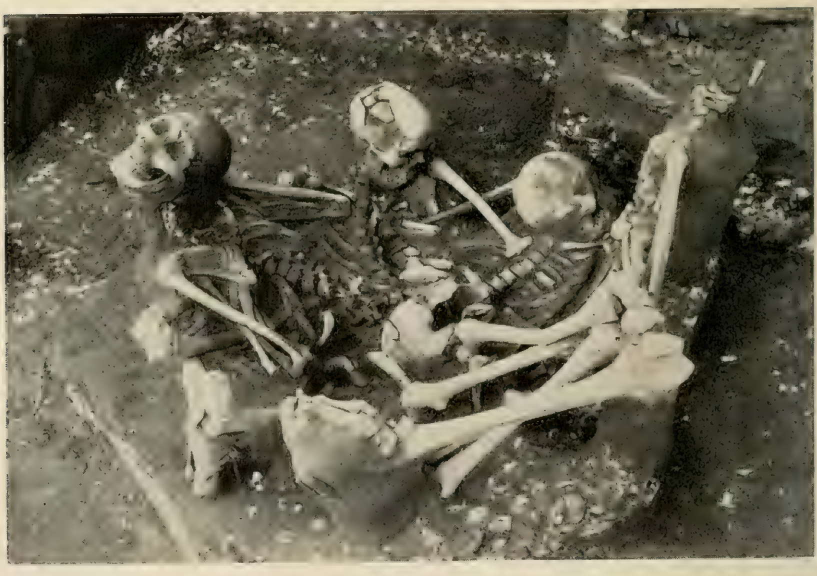
1. FOLLOWING DEEP SHELL DEPOSIT ON EAST PROFILE. SITE CT° 27.



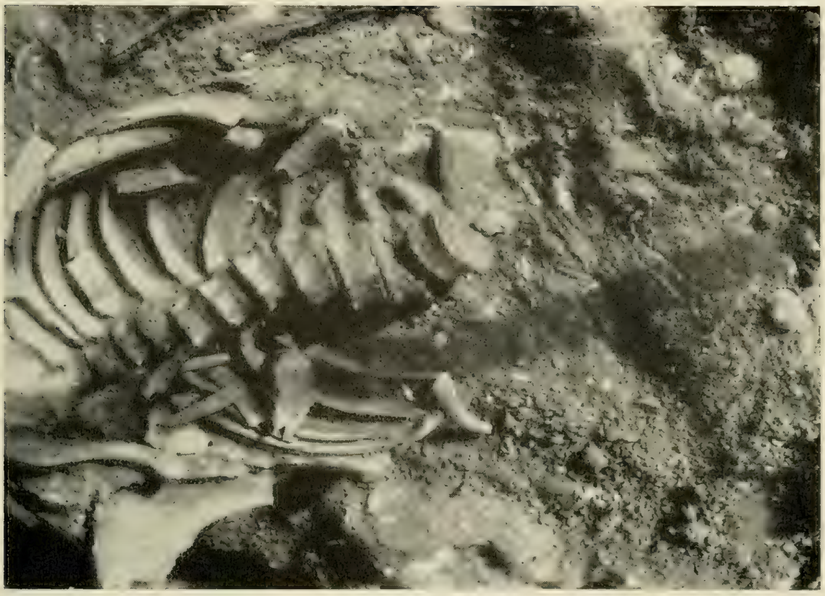
2. RIVER AT FLOOD AGAINST NORTH PROFILE. SITE CT° 27.



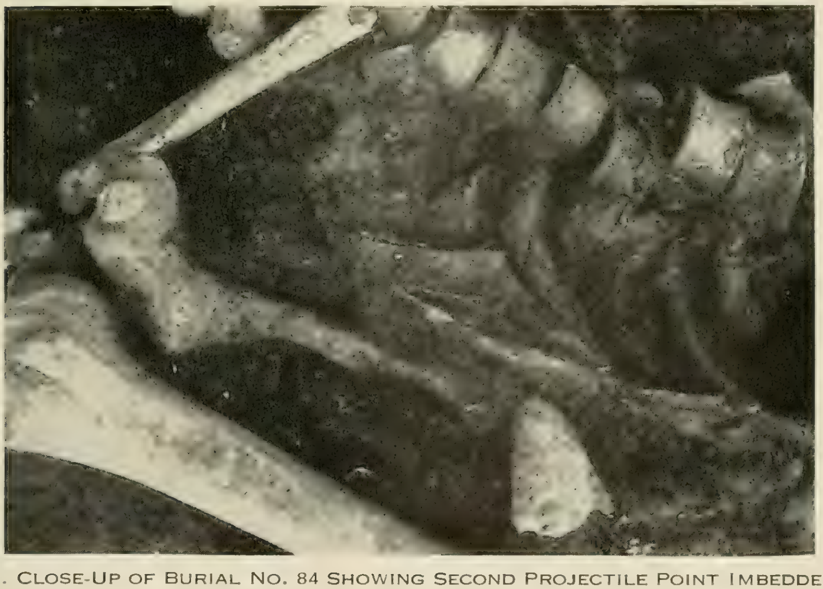
1. East Profile and Burials Nos. 83, 84, and 85. Site Ct° 27.



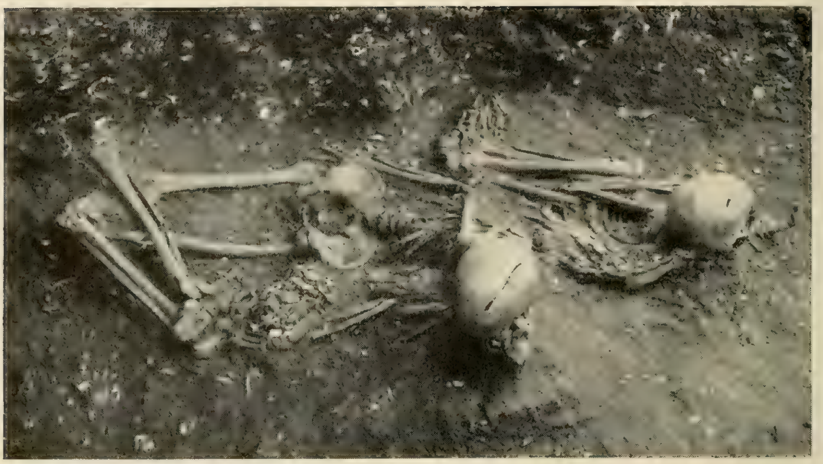
2. Close-Up of Triple Burial. Site Ct° 27



1. CLOSE-UP OF BURIAL NO. 84, SHOWING PROJECTILE POINT IMBEDDED IN CENTRUM. SITE CT° 27.

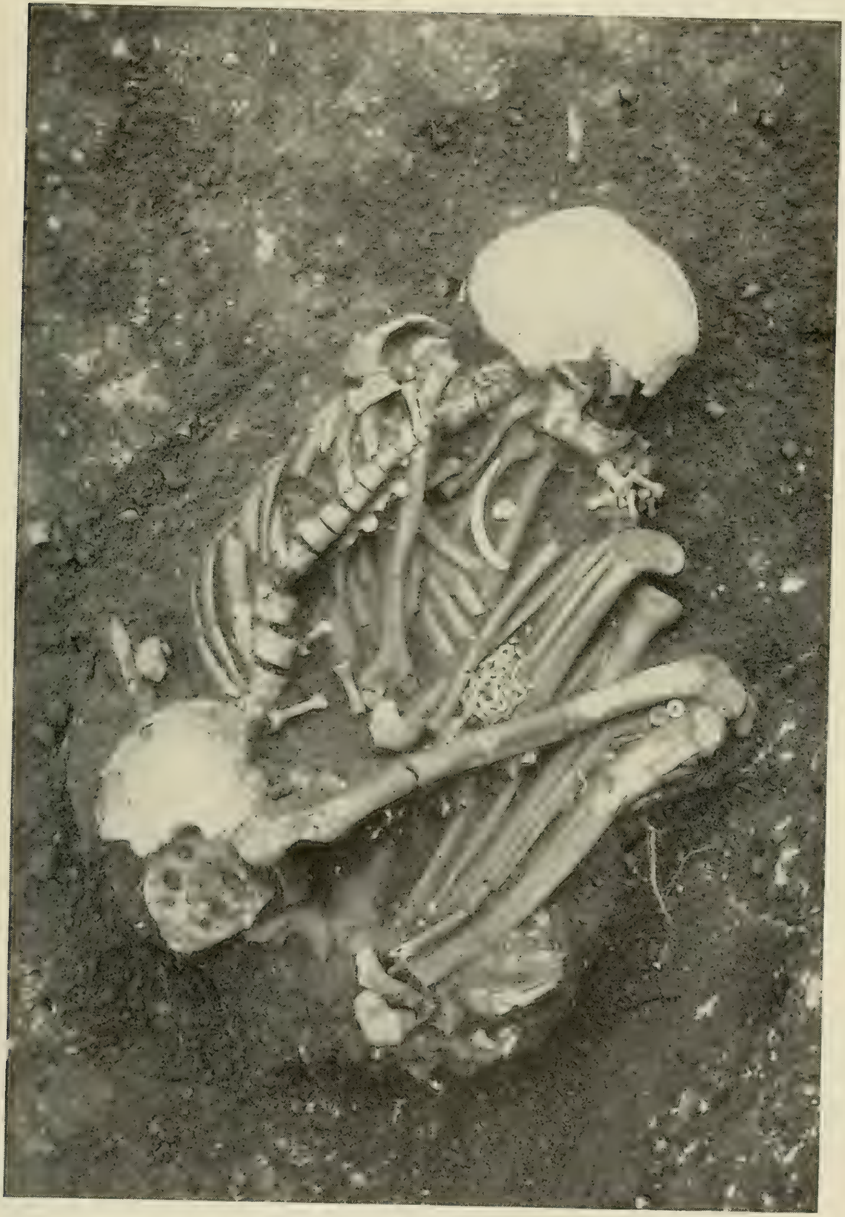


2. CLOSE-UP OF BURIAL NO. 84 SHOWING SECOND PROJECTILE POINT IMBEDDED BETWEEN NEURAL PROCESSES. SITE CT° 27.

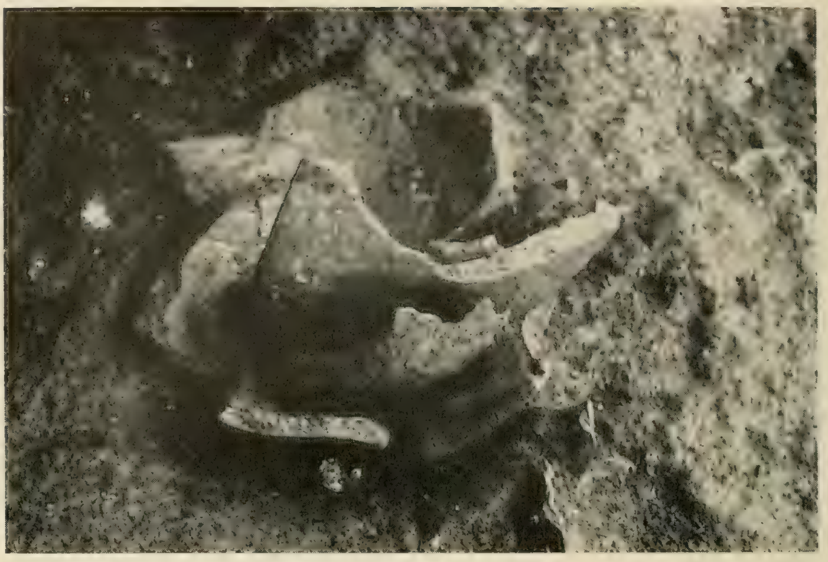


1. BURIALS NOS. 55 AND 56. SITE CT° 27.

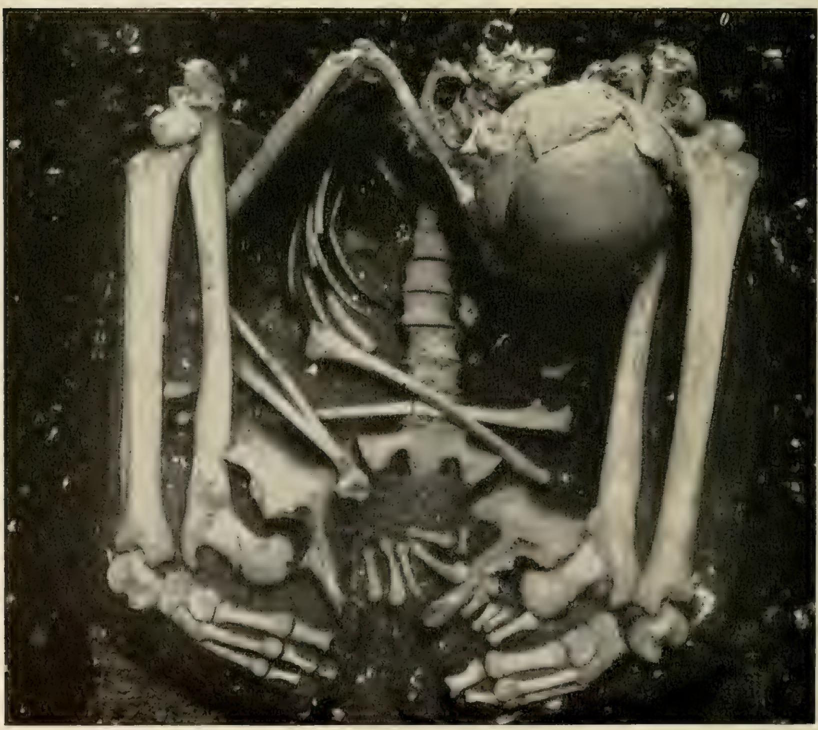
2. SUPERPOSED BURNT-EARTH FLOORS. SITE CT° 27.



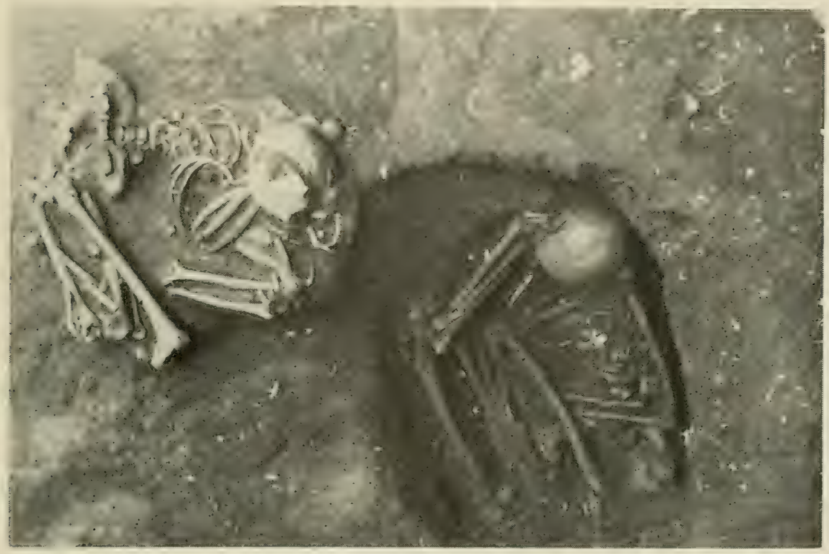
BURIAL NO. 54. SITE Ct° 27.



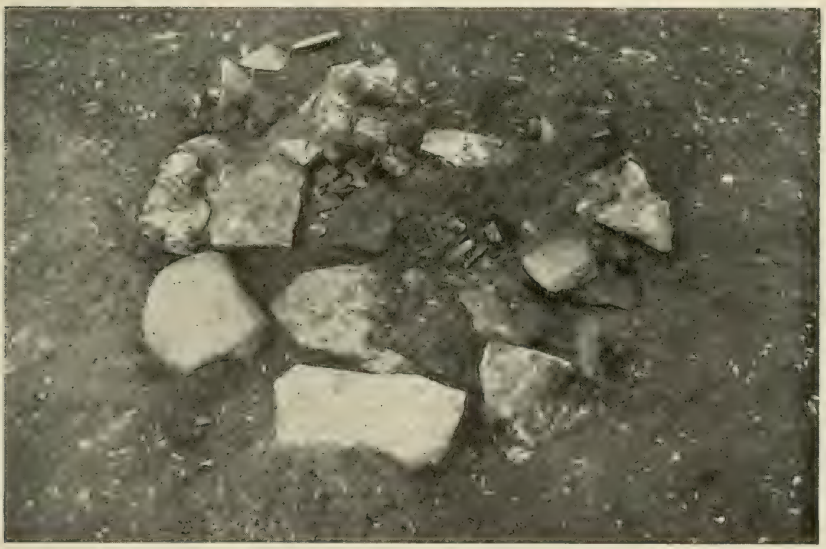
1. BROKEN VESSEL MADE FROM WORKED HUMAN SKULL. SITE CT° 27.



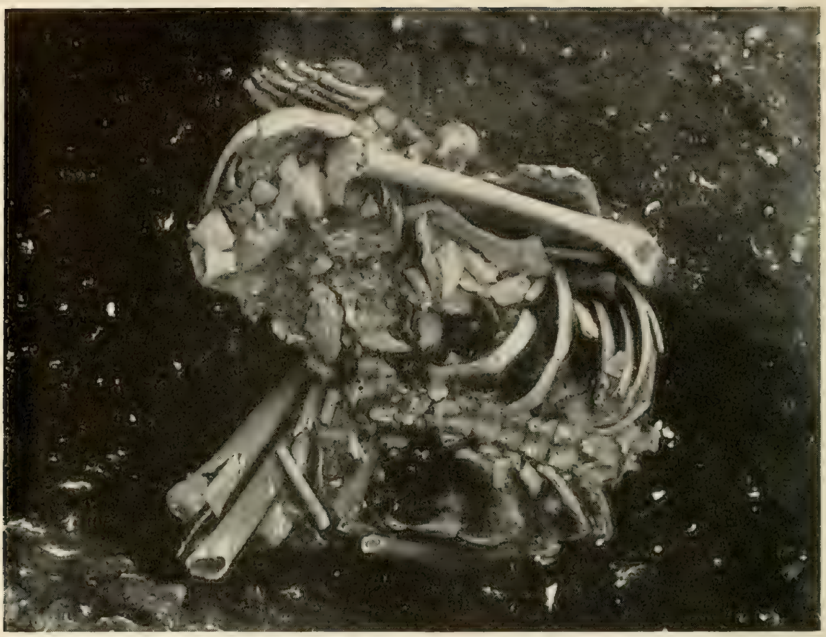
2. BURIAL NO. 11. SITE CT° 27.



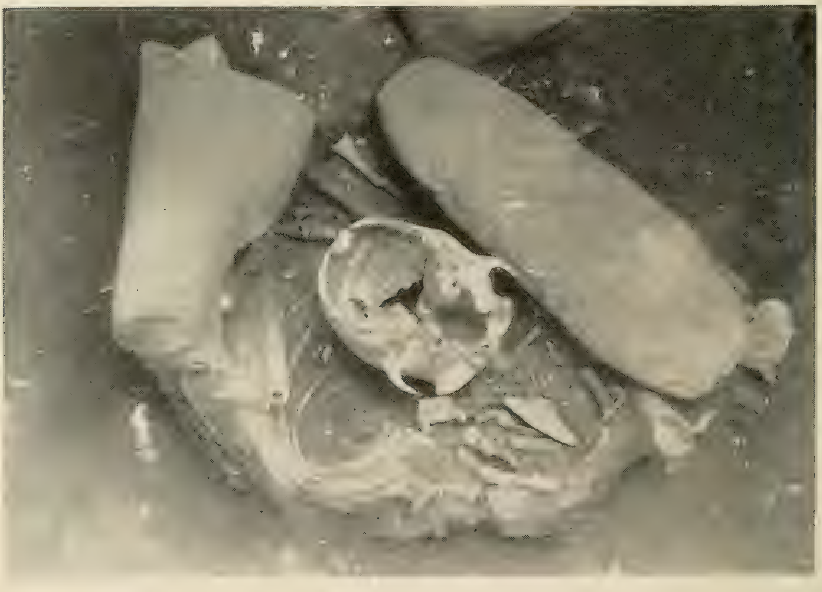
1. BURIAL NO. 34 IN PIT. SITE CT° 27.



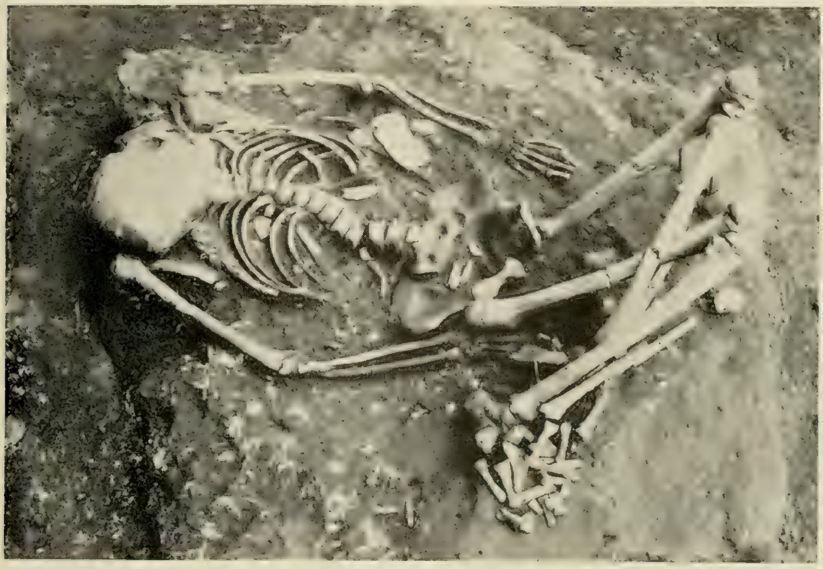
2. BURIAL NO. 79. CREMATION IN SITU. SITE CT° 27.



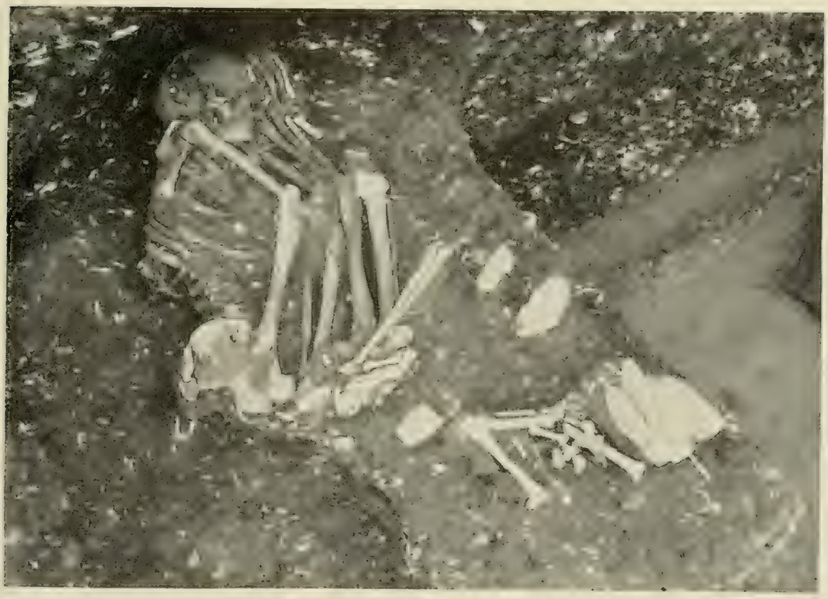
1. BURIAL NO. 45. BURIED IN SITTING POSTURE. SITE CT° 27.



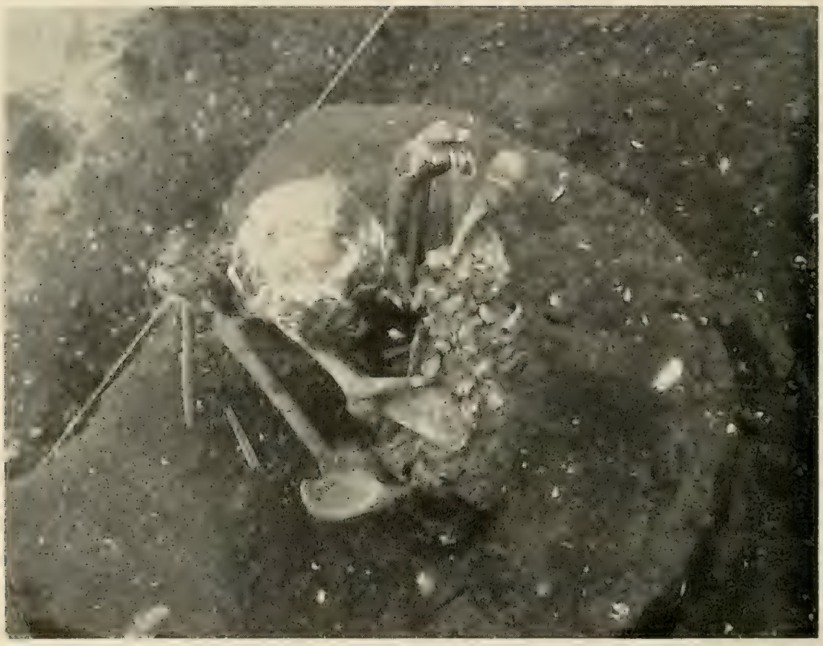
2. BURIAL NO. 28. BURIED IN SITTING POSTURE. SITE CT° 27.



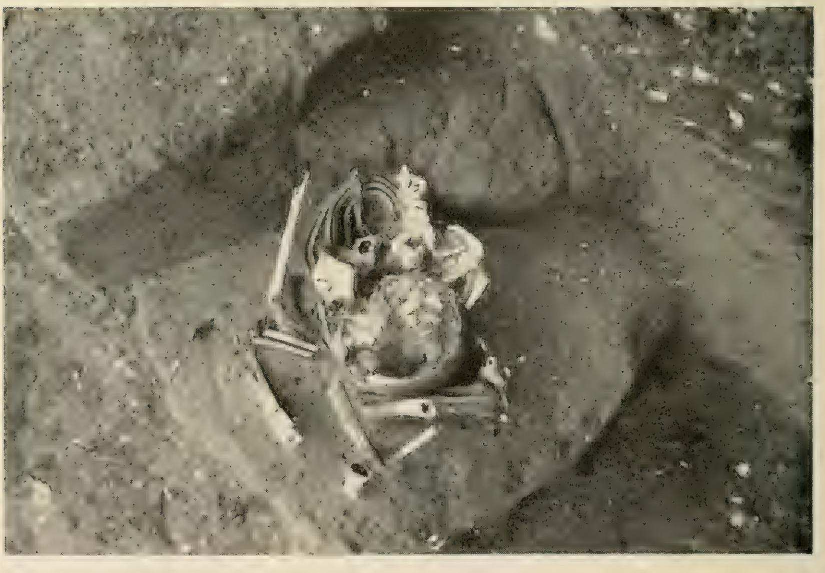
1. BURIAL NO. 85. SITE CT° 27.



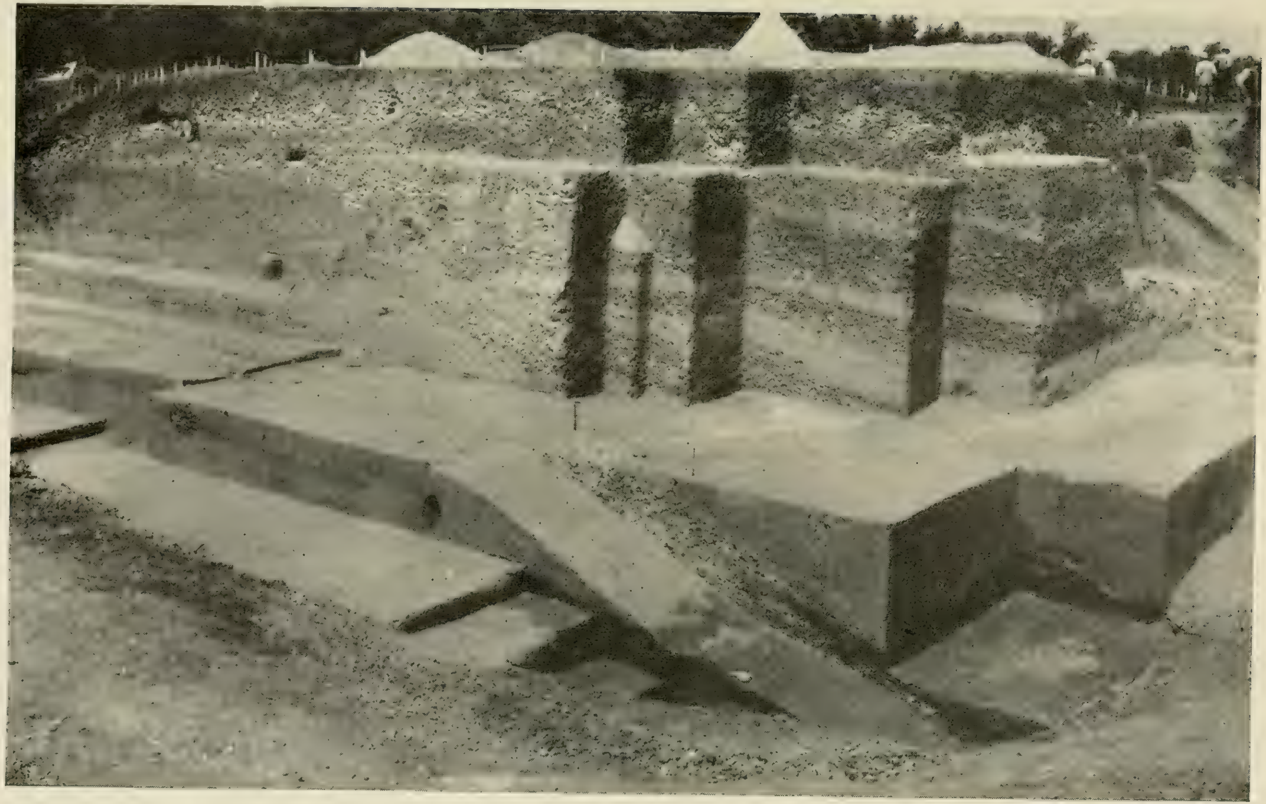
2. BURIALS NOS. 80 AND 81. SITE CT° 27.



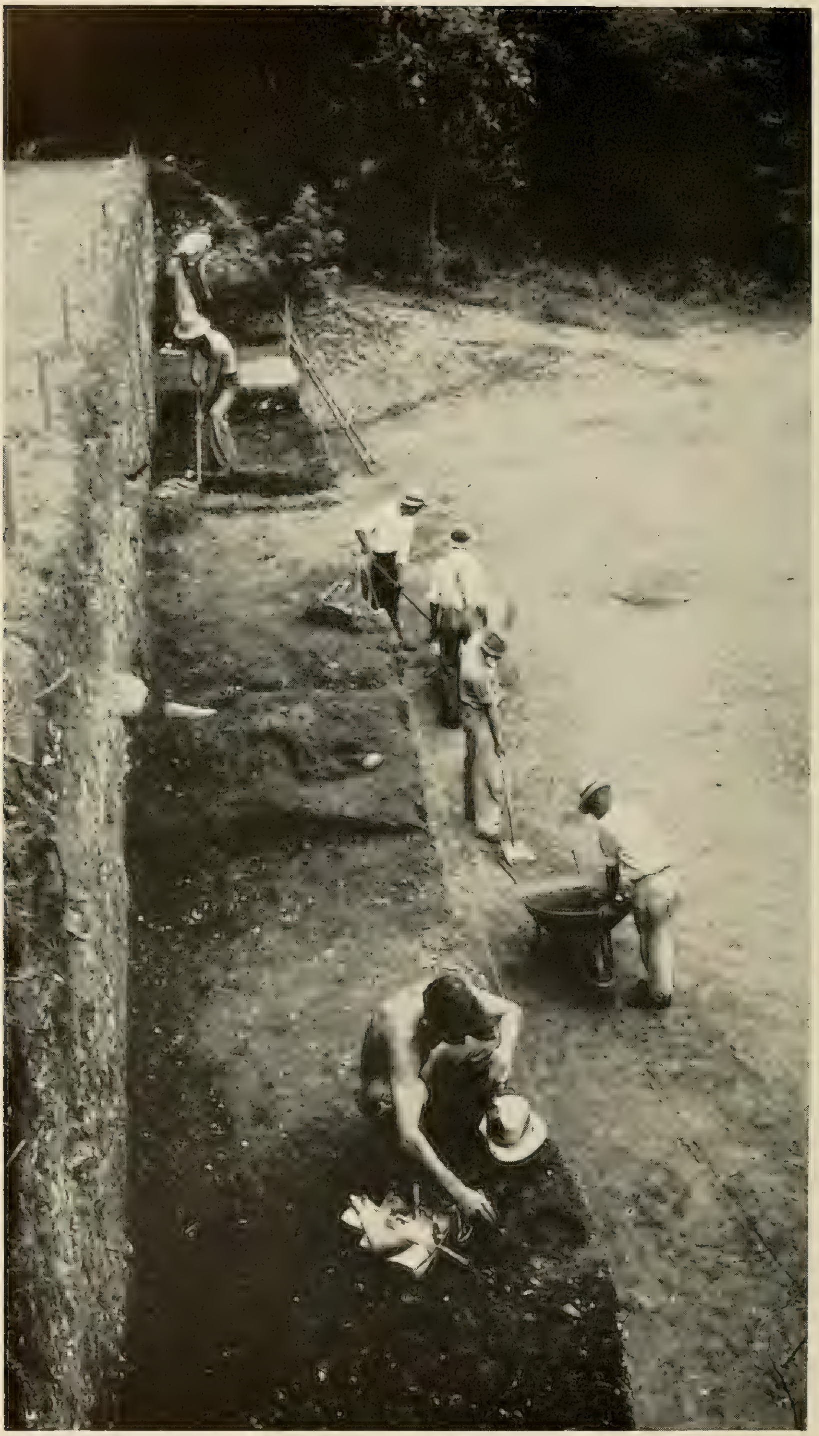
1. BURIAL NO. 43. SITTING POSTURE. SITE CT° 27.



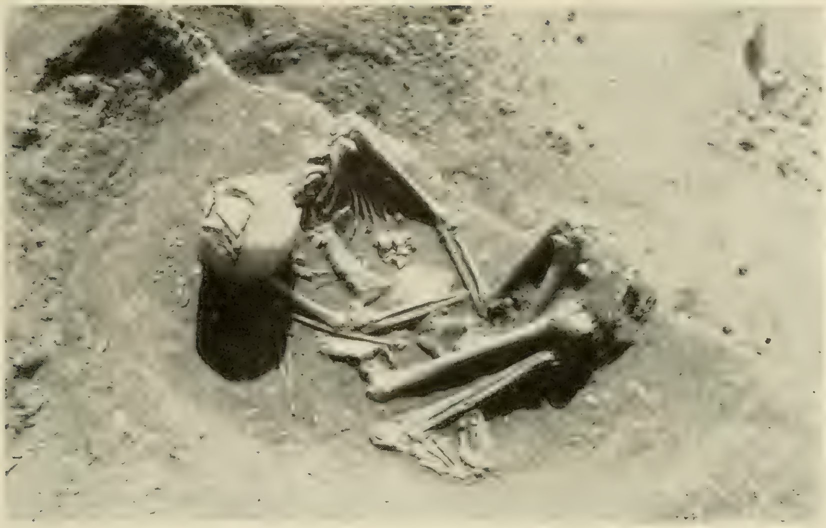
2. BURIAL NO. 68 IN SITTING POSTURE ON OLD FIRE HEARTH. SITE CT° 27.



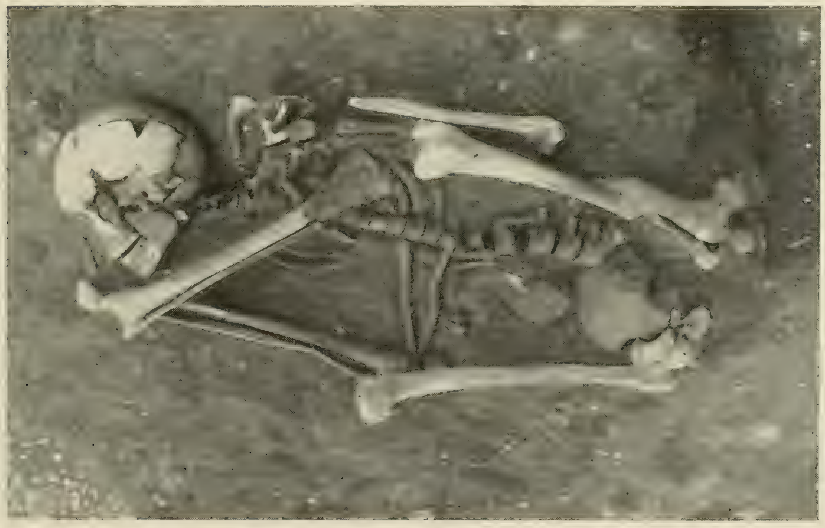
East Profile and Northeast Corner of Mound After Clearing Away Flood Debris. (Note Deep Dipping Shell Layer.) Site Ct° 27.



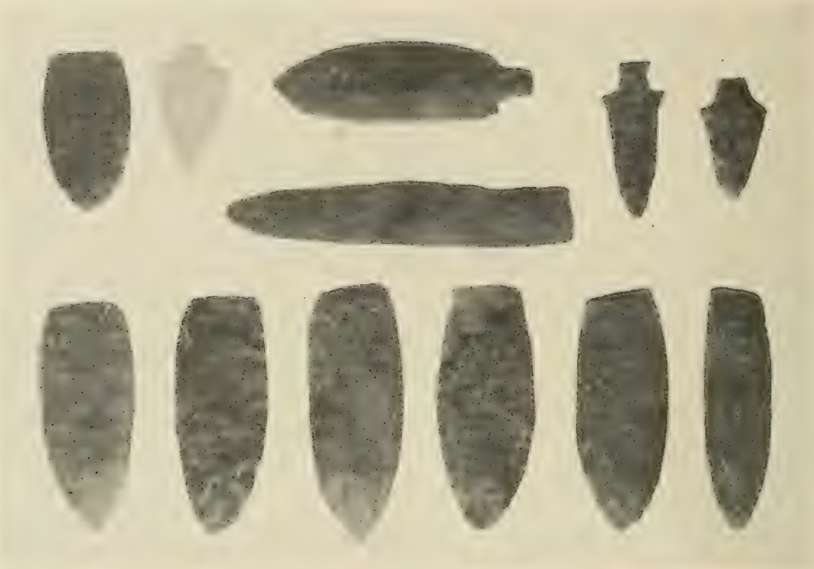
CUTTING DOWN 10-FOOT PROFILE, LOOKING WEST. SITE CTº 27.



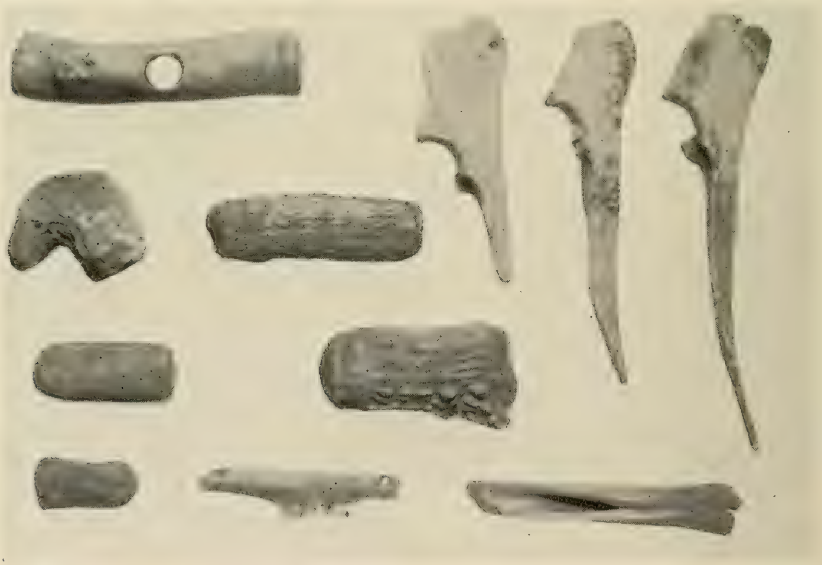
1. BURIAL NO. 127 WITH LONG-BONE NEEDLES. SITE CT° 27.



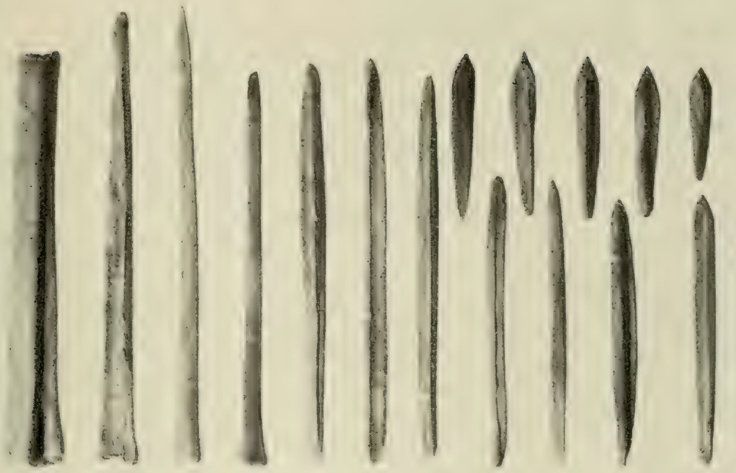
2. BURIAL NO. 135. SITE CT° 27.



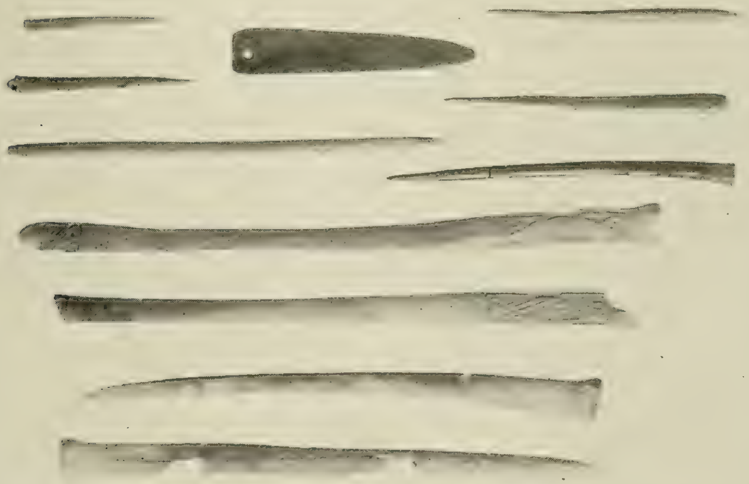
1. Flint From Burials, Lower Row of Six With Burial No. 119. Site Ct° 27.



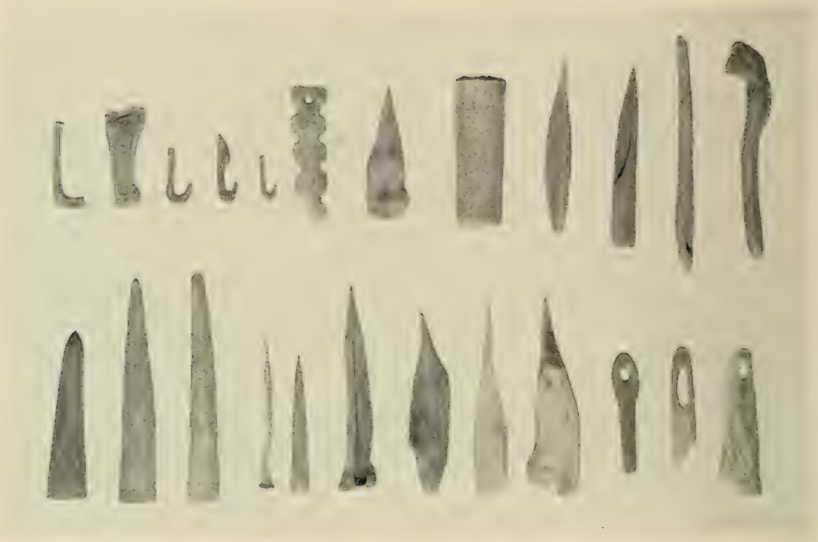
2. Worked Bone and Horn. Site Ct° 27.



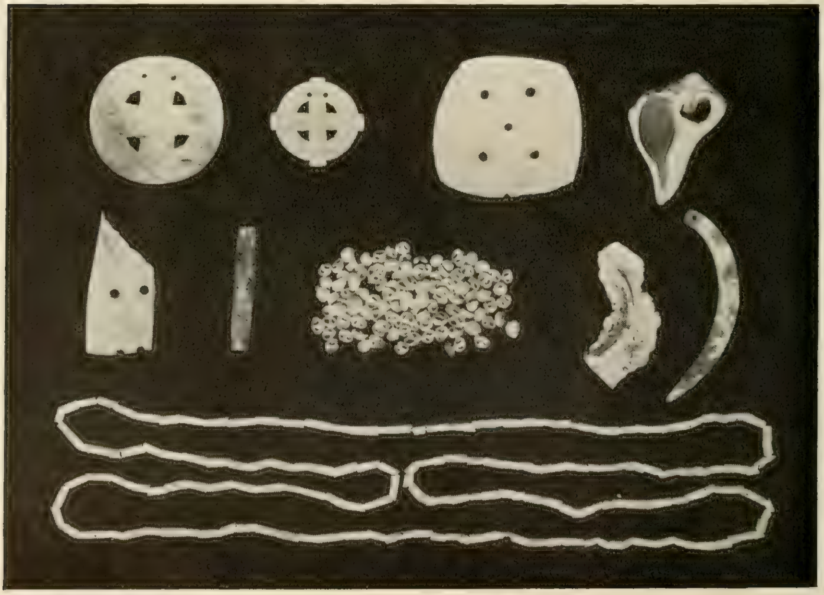
1. BONE AWLS AND PROJECTILE POINTS. SITE CT° 27.



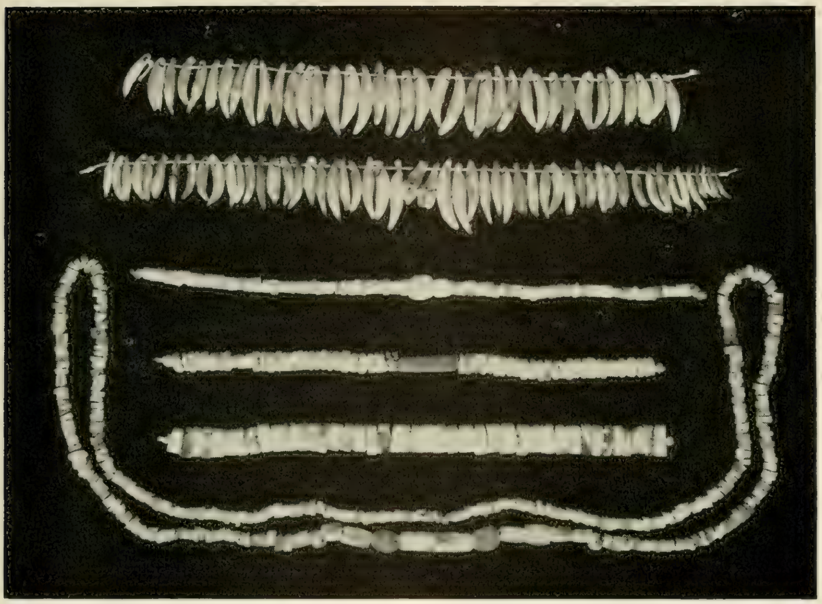
2. CARVED BONE AWLS AND SPATULAS. SITE CT° 27.



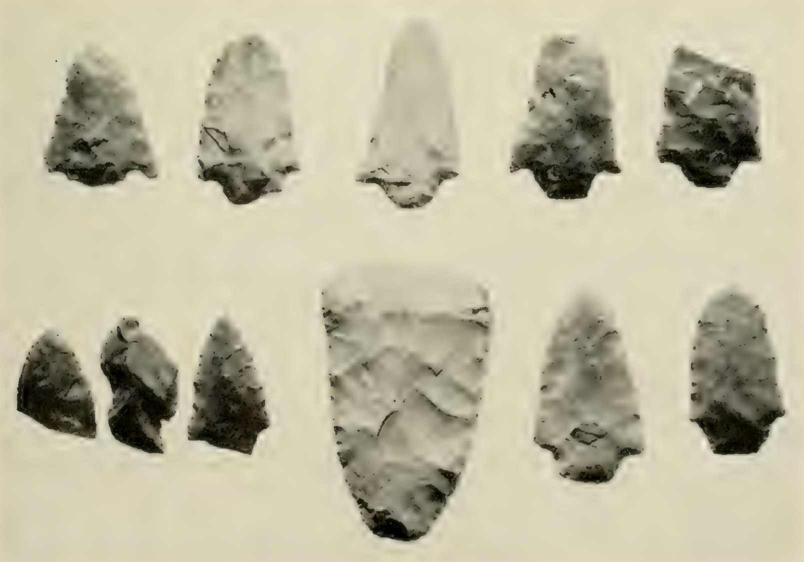
1. BONE AWLS, ANTLER SPEAR POINTS, AND FISH HOOKS. SITE CT° 27.



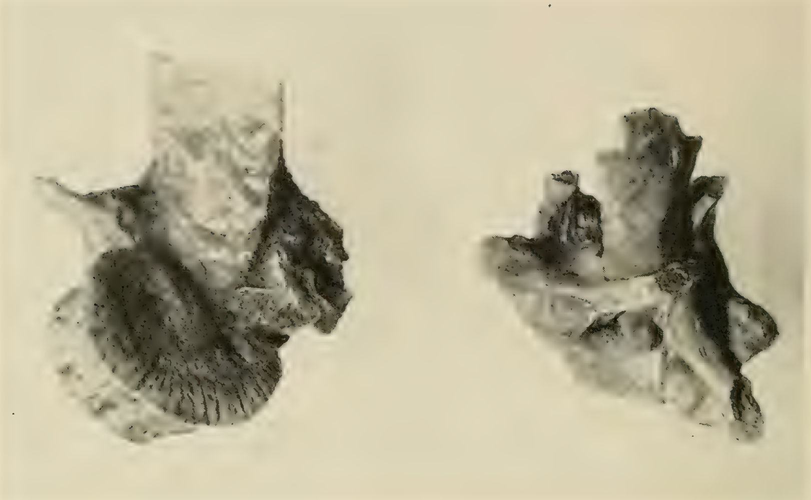
2. SHELL BEADS AND GORGETS. SITE CT° 27.



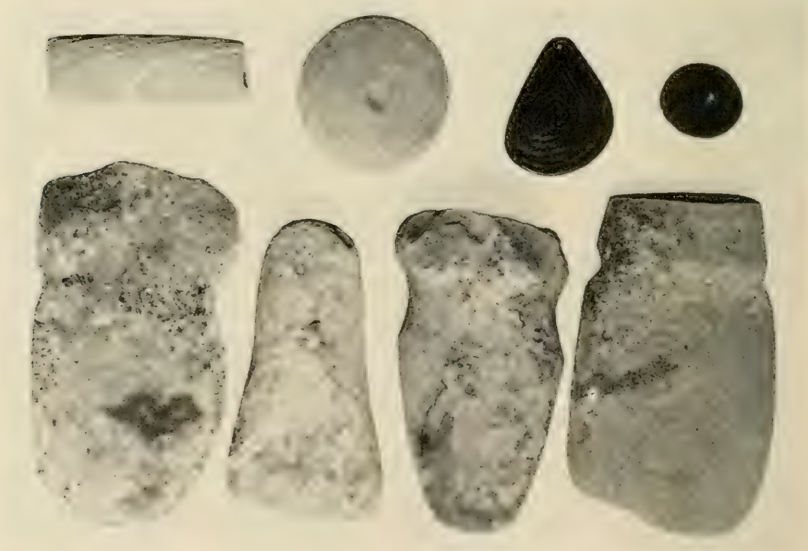
1. BEADS OF SHELL AND PERFORATED TEETH. SITE CT° 27.



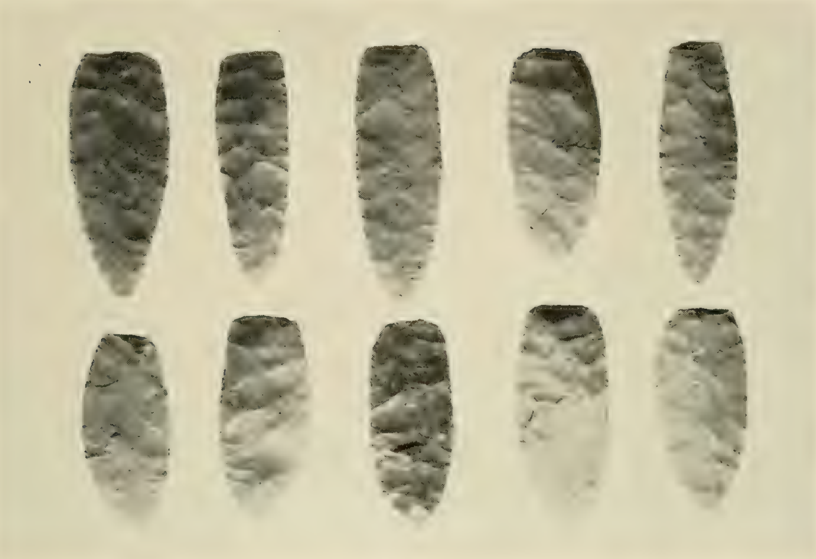
2. FLINT POINTS IN ASSOCIATION WITH BURIALS NOS. 83, 84, AND 85. SITE CT° 27.



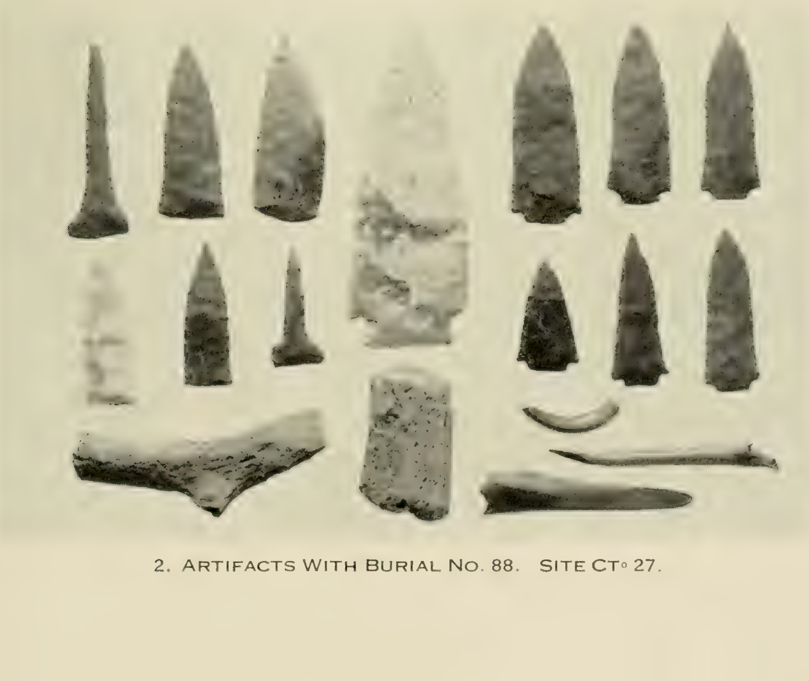
1. PROJECTILE POINTS IMBEDDED IN VERTEBRAE. LEFT, BURIAL NO. 85; RIGHT, BURIAL NO. 84. SITE CT° 27.



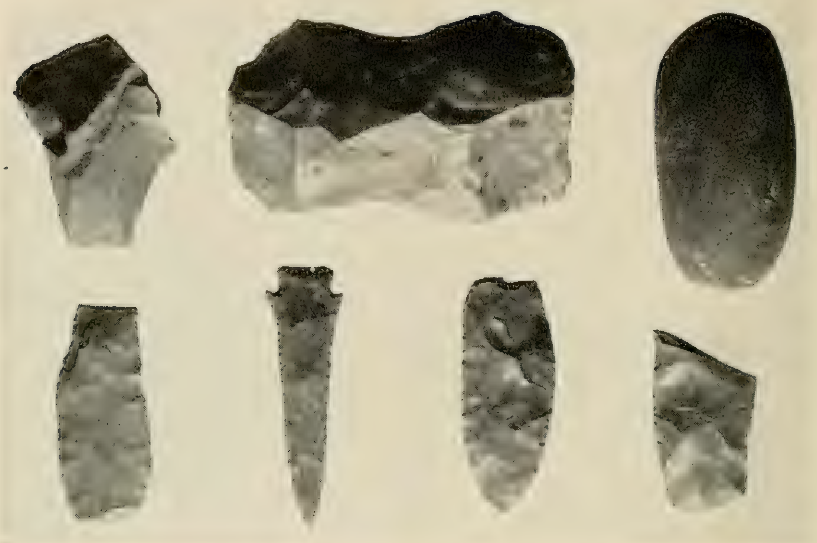
2. AXES, PESTLE, PENDANT, CONE, HAMMERSTONE, AND PERFORATED STONE CYLINDER. SITE CT° 27



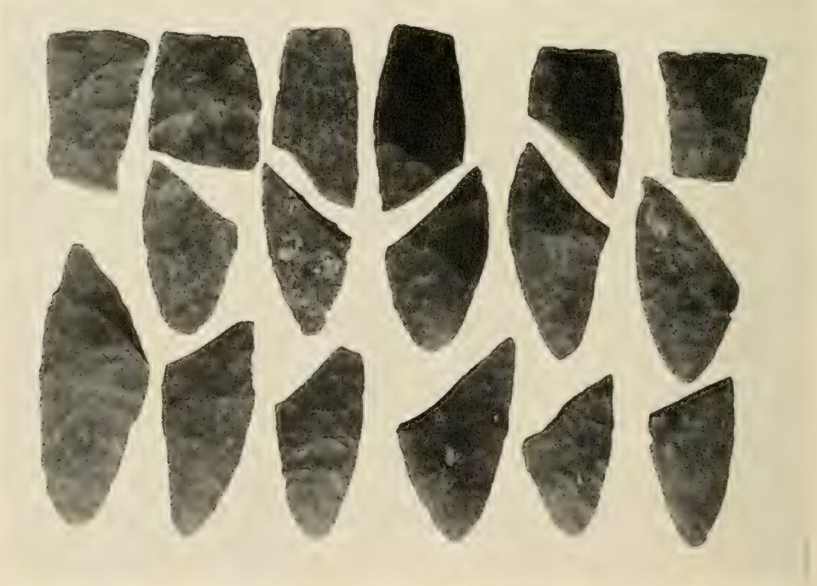
1. TEN FLINT BLADES WITH BURIAL NO. 81. SITE CT° 27.



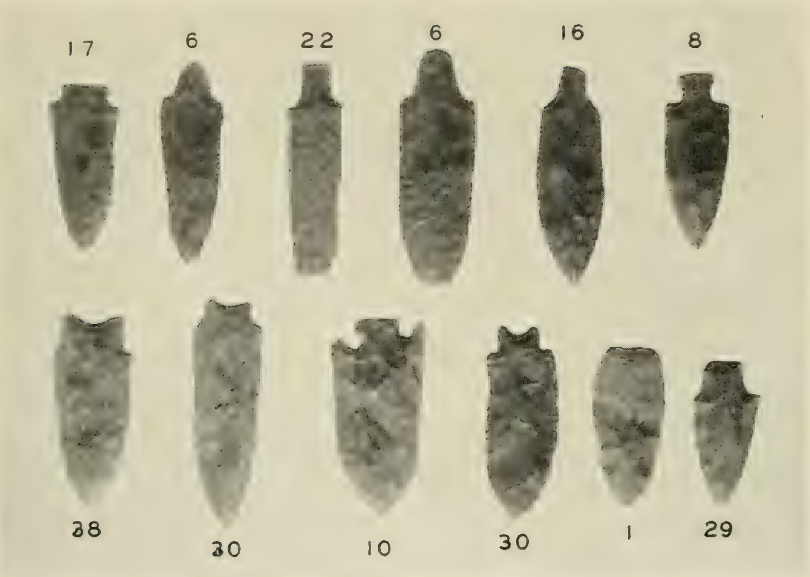
2. ARTIFACTS WITH BURIAL NO. 88. SITE CT° 27.



1. ARTIFACTS WITH BURIAL NO. 57. SITE CT° 27.



2. TYPES 25 (BASE) AND 26 (POINT). SITE CT° 27.


17
6
22
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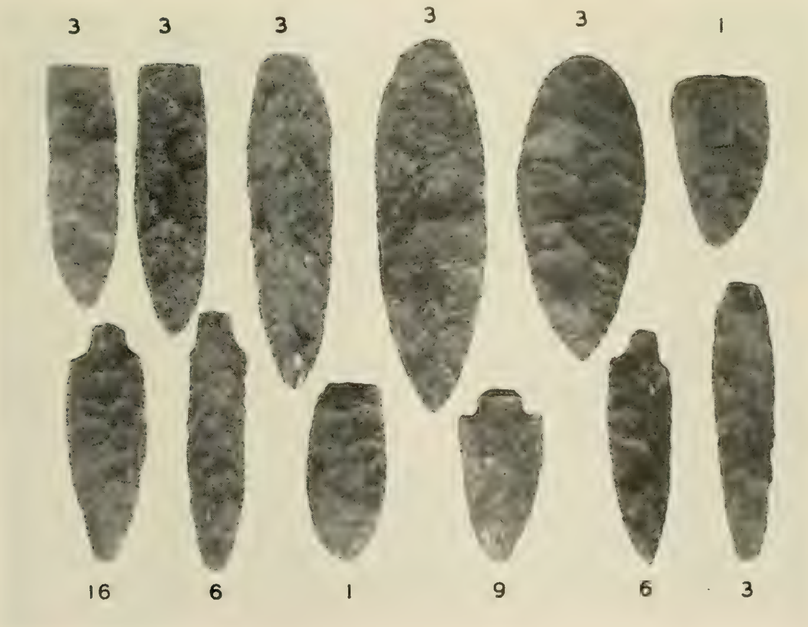
16
8
38
30
10
30
1
29

1. FLINT TYPE FORMS. SITE CT° 27.


3
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3
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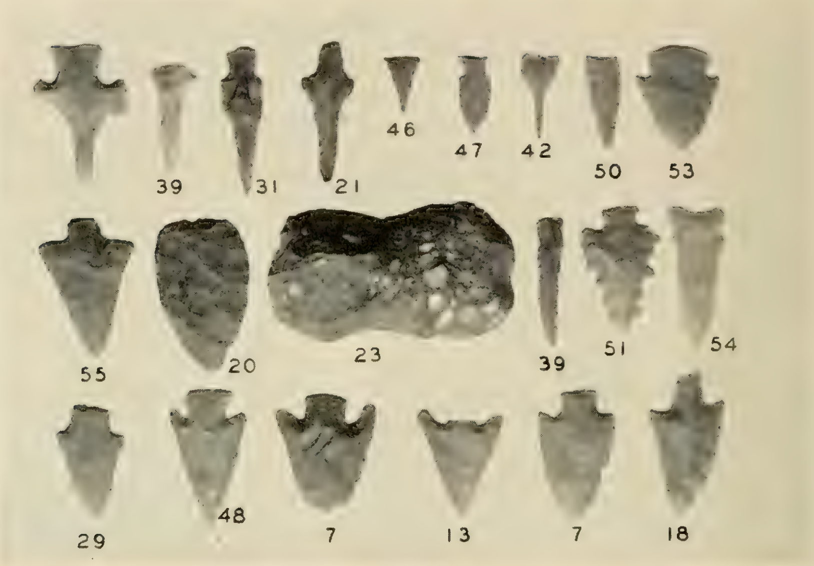
16
6
1
9
6
3

2. FLINT TYPE FORMS. SITE CT° 27.


39
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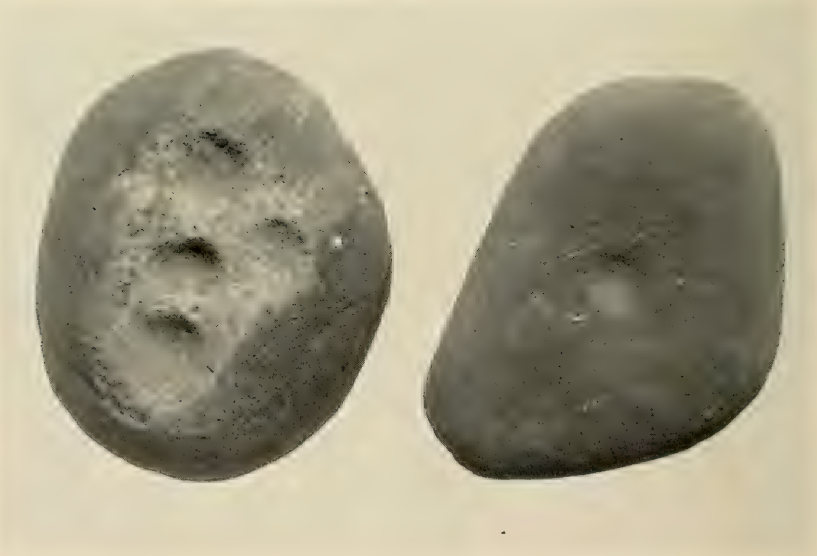
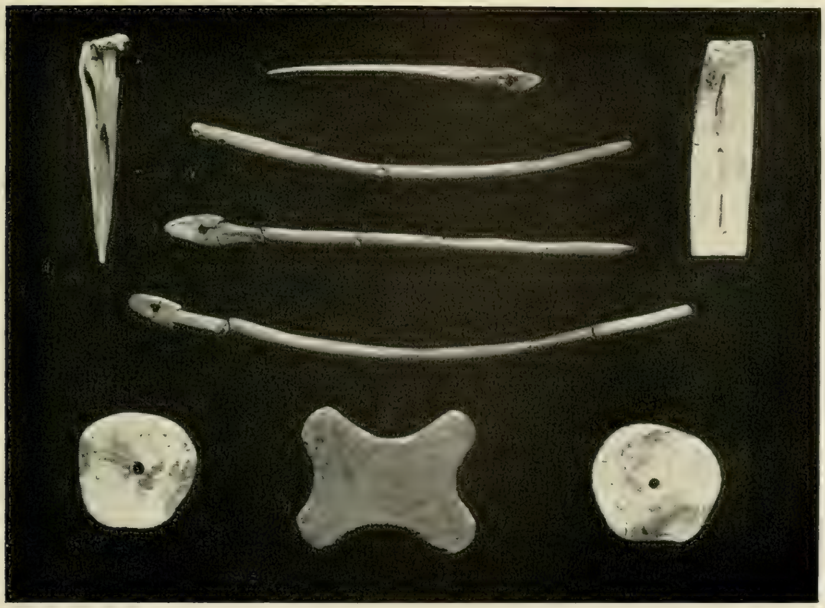
48
7
13
7
18

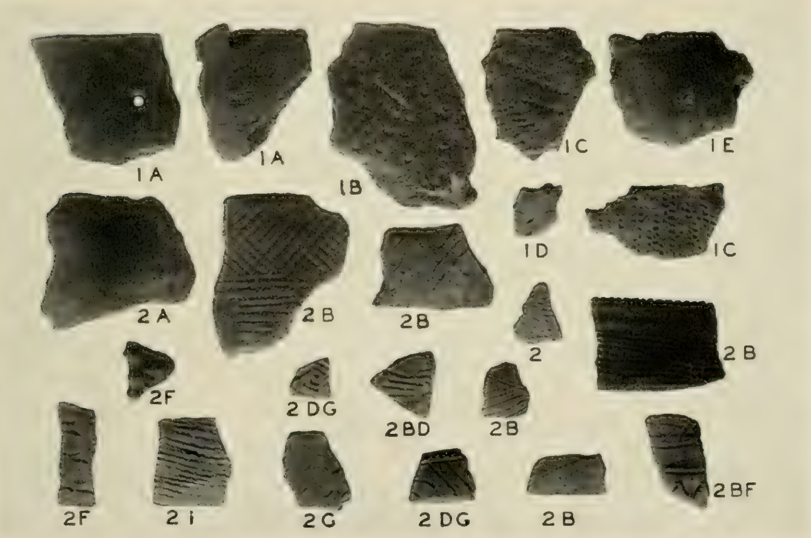
1. Flint Type Forms. Site Ct° 27.



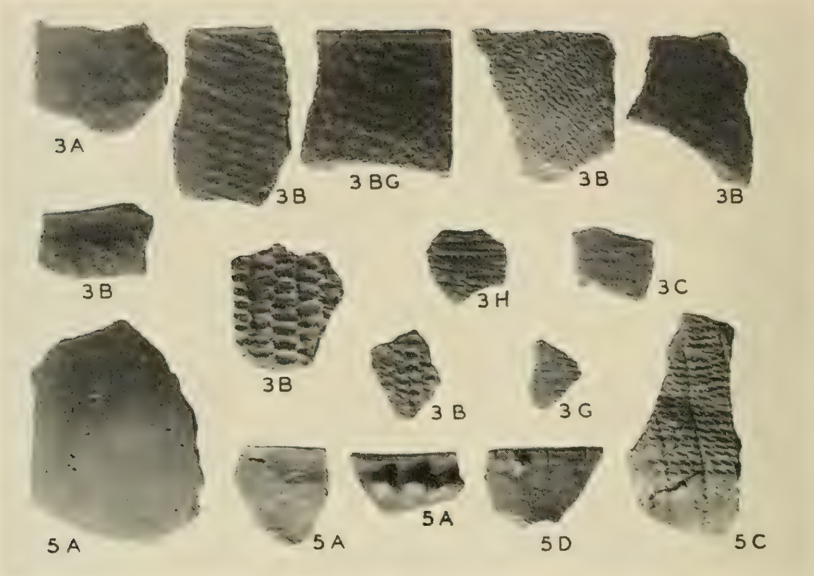
2. Anvil Stones. Site Ct° 27.



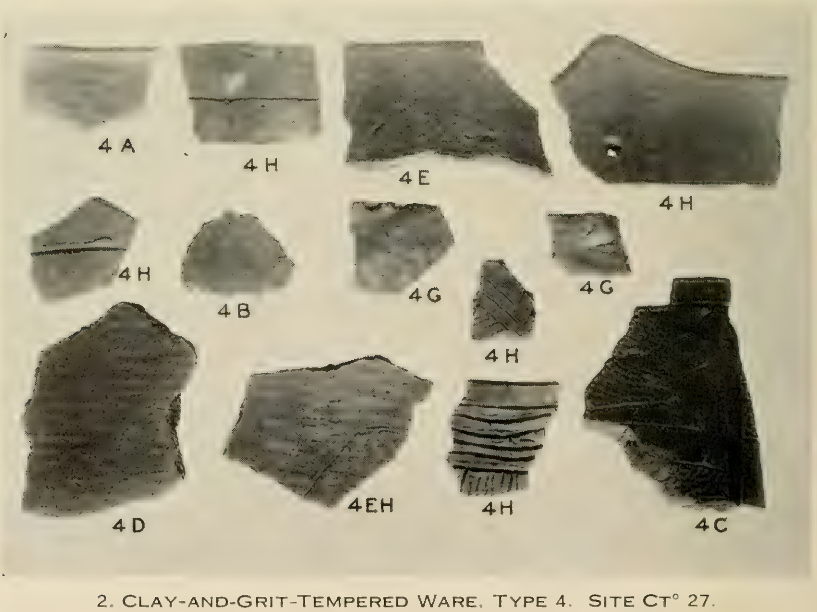
1. Four Bone Needles. Burial No. 127. Site Ct° 27.


1 A
1 A
1 B
1 C
1 E
2 A
2 B
2 B
1 D
1 C
2
2 B
2 F
2 DG
2 BD
2 B
2 F
2 i
2 G
2 DG
2 B
2 BF

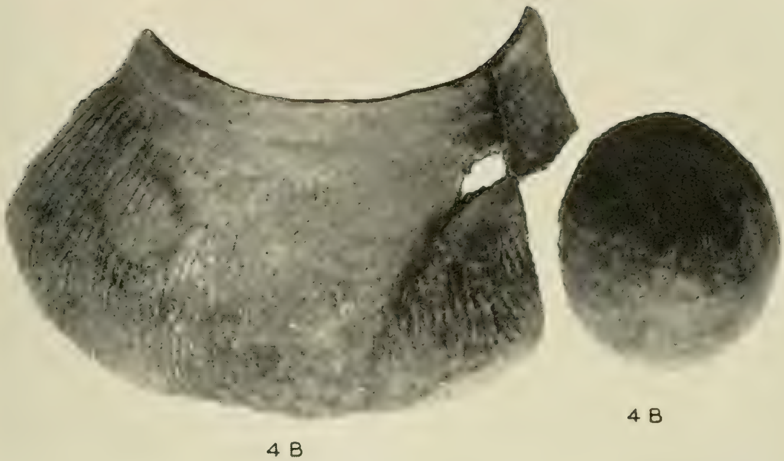
2. Fiber-Tempered Ware, Type 1, and Sand-Tempered Ware, Type 2. Site Ct° 27.


3A
3B
3BG
3B
3B
3B
3B
3H
3C
3B
3G
5A
5A
5A
5D
5C

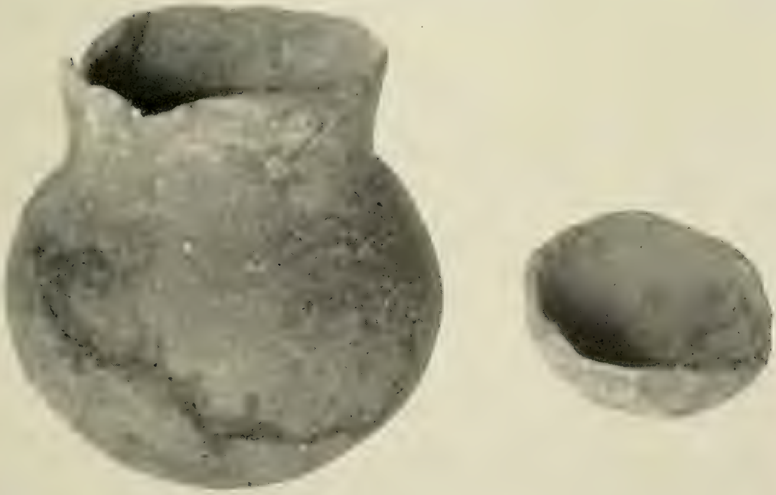
1. Limestone-Tempered Ware, Type 3, and Shell-Tempered Ware, Type 5. Site Ct° 27.


4A
4H
4E
4H
4H
4B
4G
4G
4H
4D
4EH
4H
4C

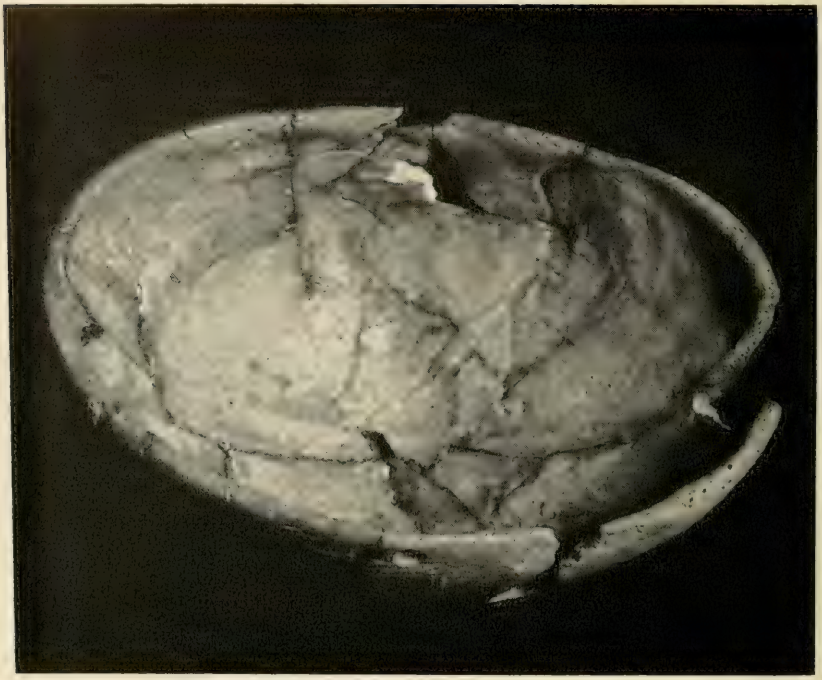
2. Clay-and-Grit-Tempered Ware, Type 4. Site Ct° 27.



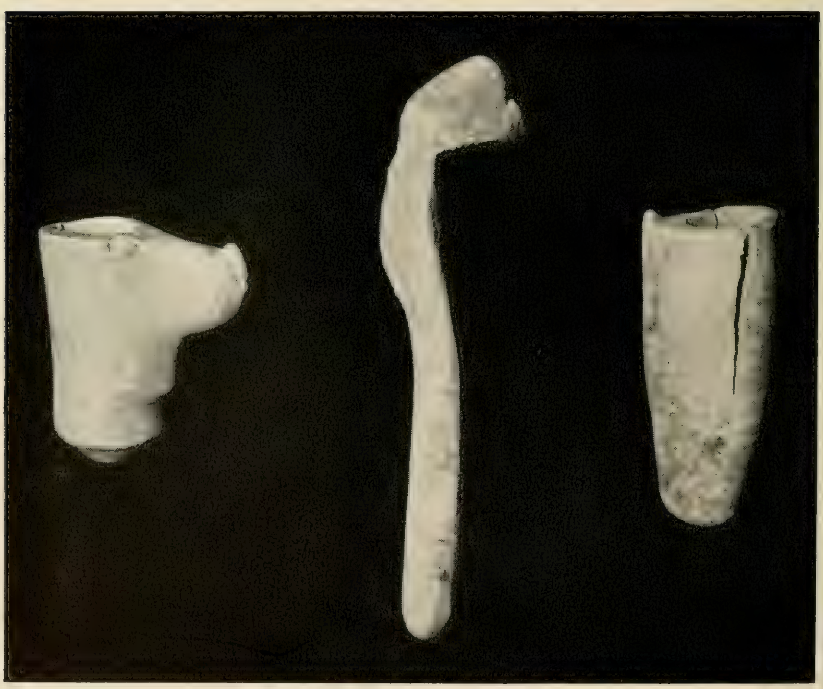
1. Large Sherds, Type 4 Ware. Site Ct° 27.



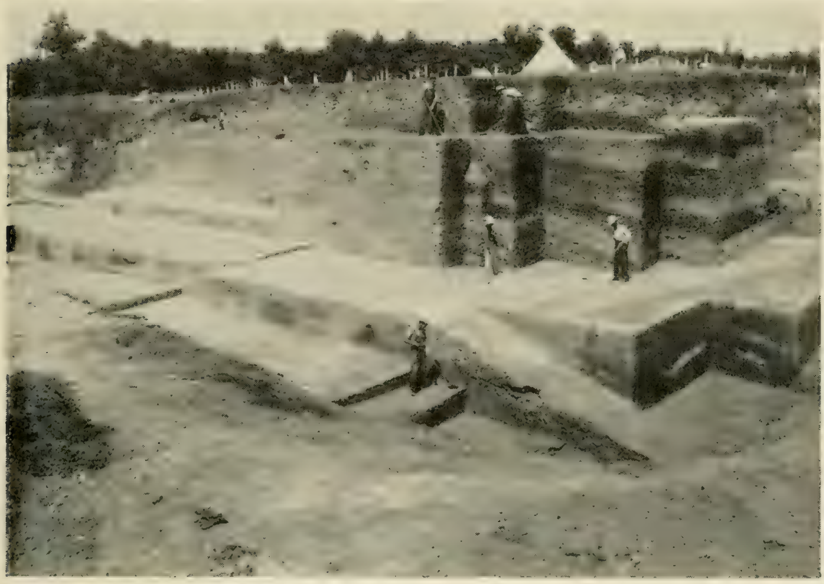
2. Shell-Tempered Pottery, Type 5A. Burial No. 15. Site Ct° 27.



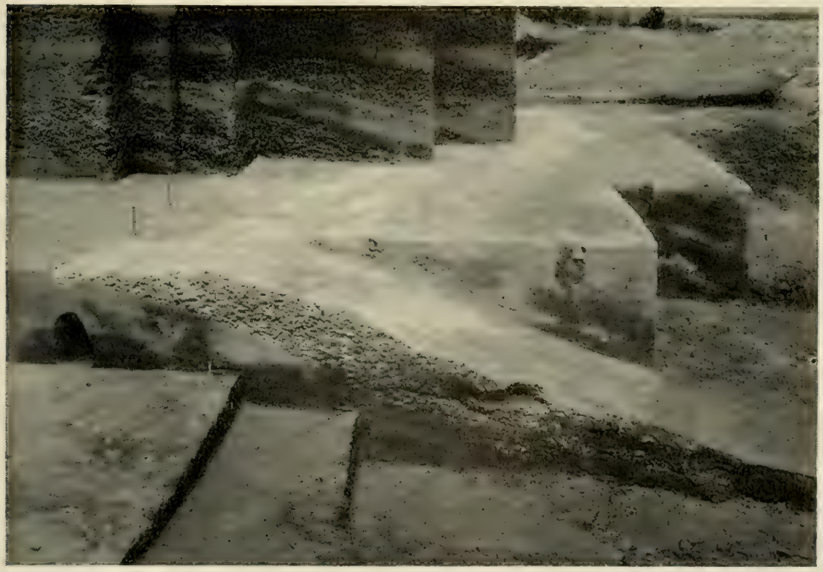
1. Bowl Made From Human Skull. Site Ct° 27.



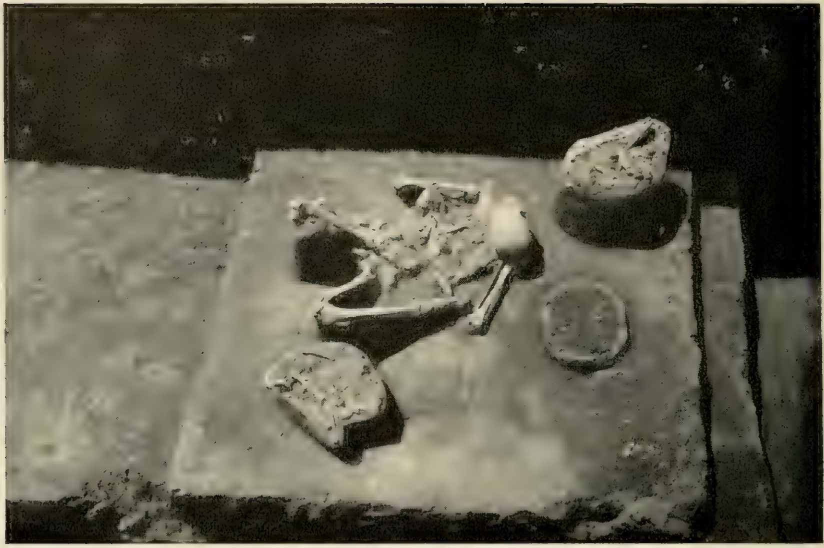
2. Atlatl Hooks of Horn. Site Ct° 27



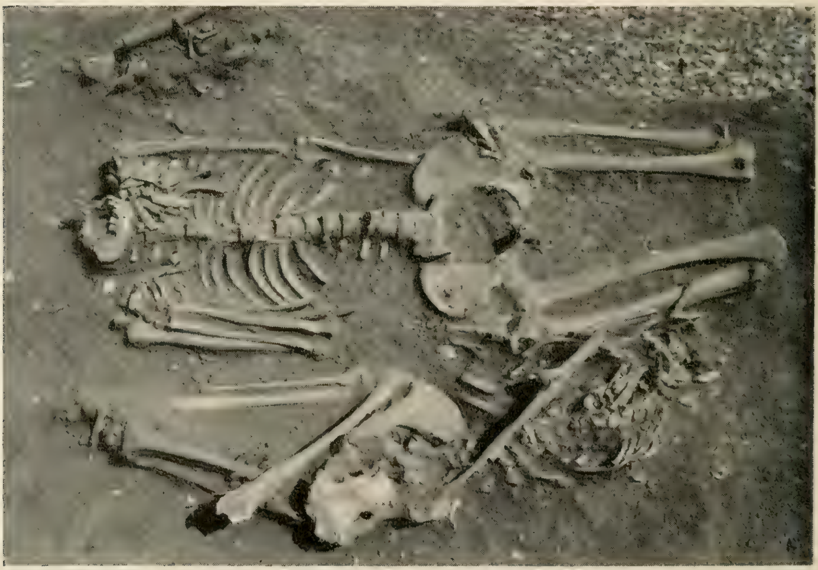
1. FINAL PROFILE AT TIME EXCAVATION CEASED. SITE CT° 27.



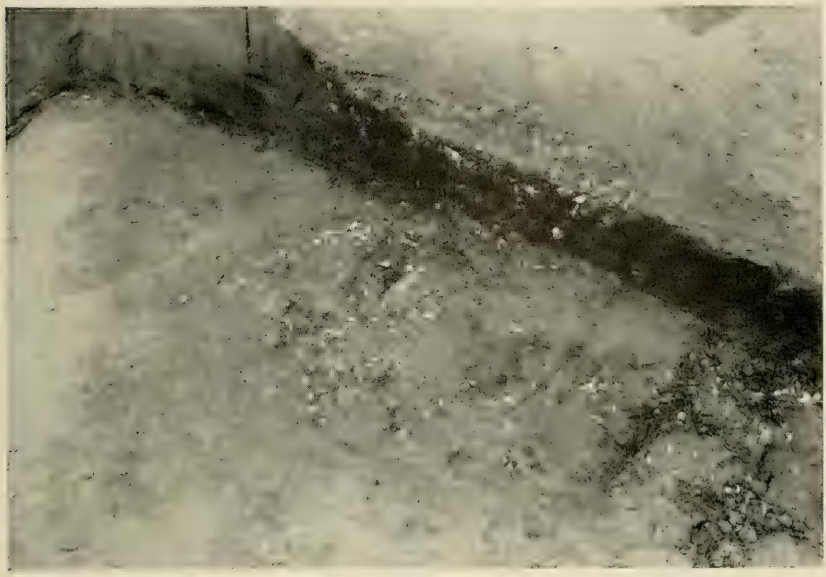
2. THE LOW-DIPPING SHELL LAYER ON THE OLD BANK OF THE RIVER. SITE CT° 27.



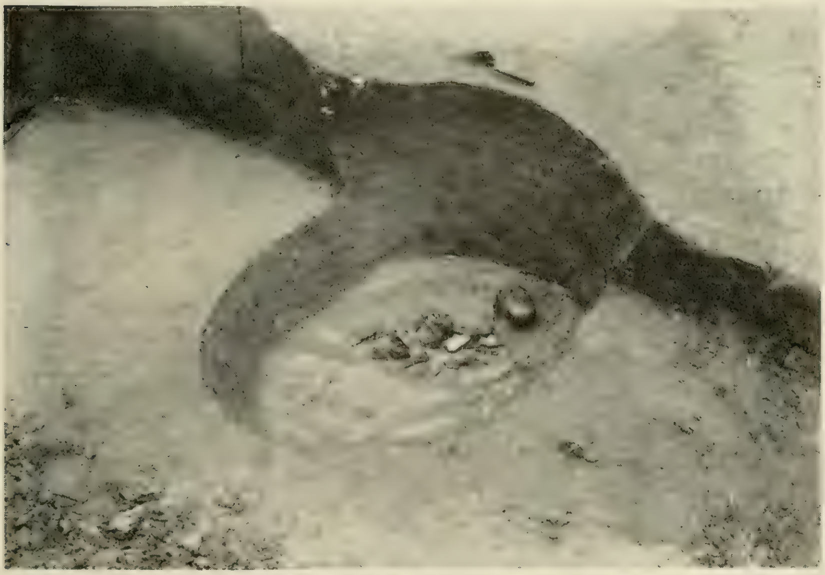
1. BURIAL NO. 88. WITH TWO DOG SKELETONS ASSOCIATED. SITE CT° 27.



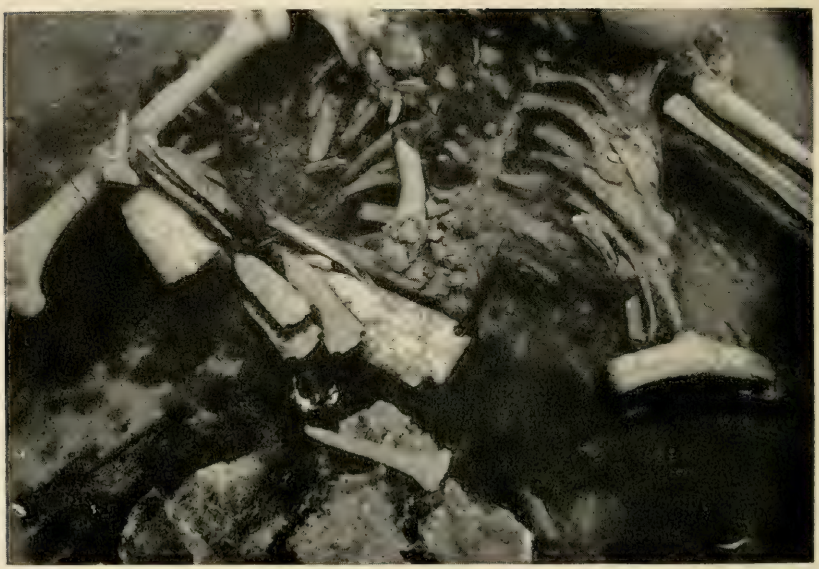
2. BURIALS NOS. 108 AND 136 NEAR SURFACE. LOWER LEGS FOLDED. HEADLESS. SITE CT° 27.



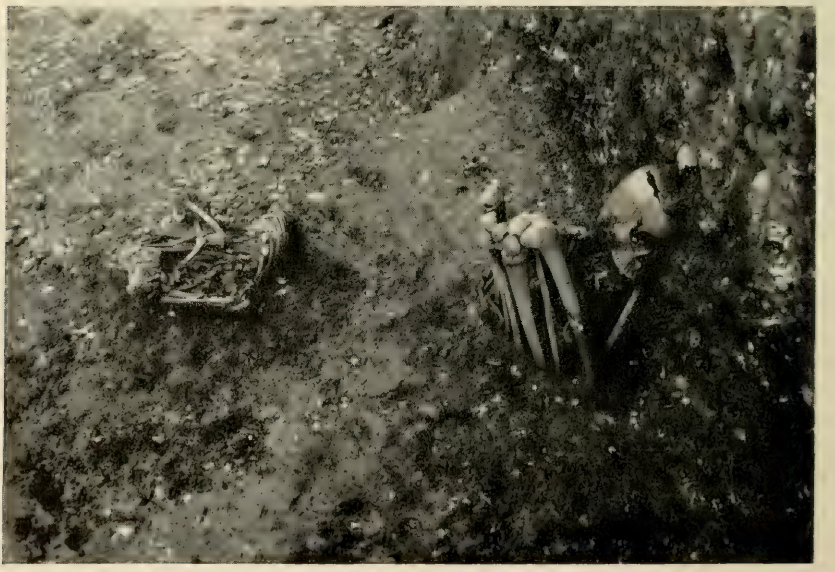
1. A MIDDEN PIT UNDER LOWEST SHELL LAYER. SITE CT° 27.



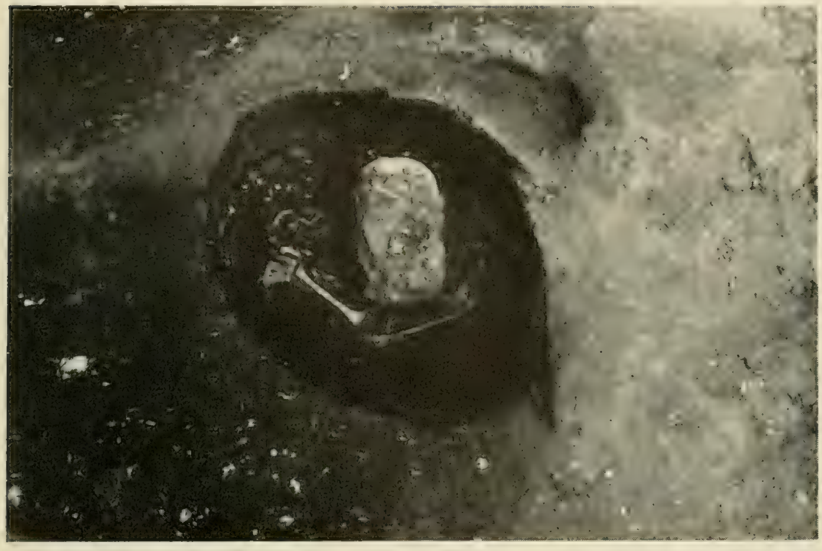
2. PIT EXCAVATED. SITE CT° 27.



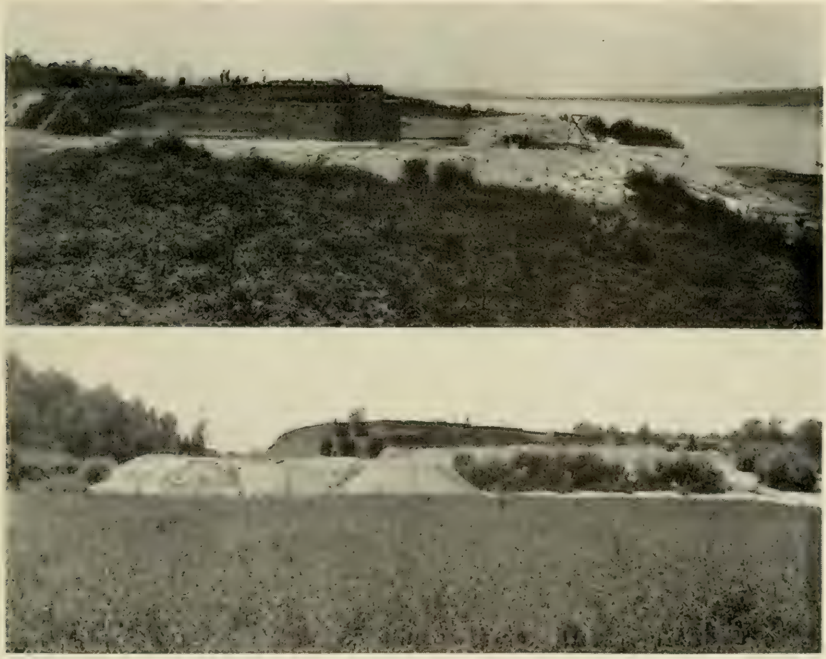
1. Cache of Artifacts With Burial No. 88. Site Ct° 27.



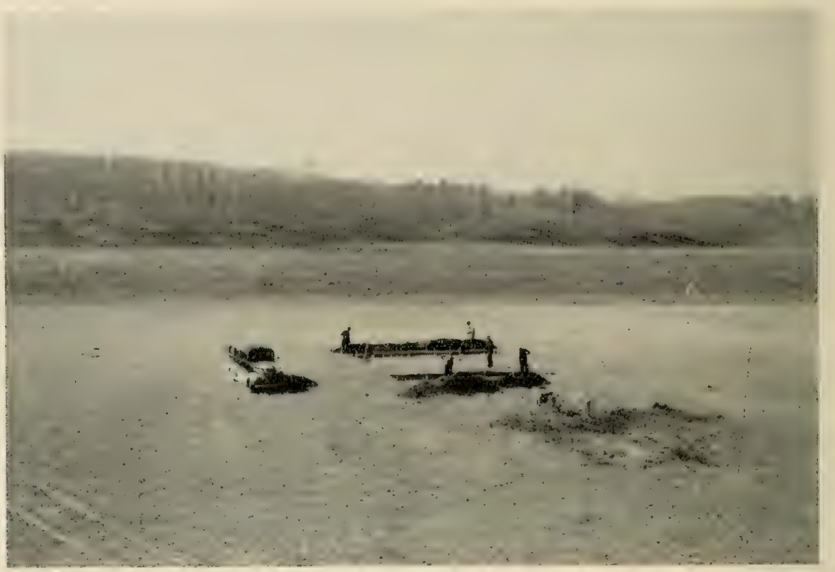
2. Burial No. 87, Sitting Posture With Dog Skeleton. Site Ct° 27.



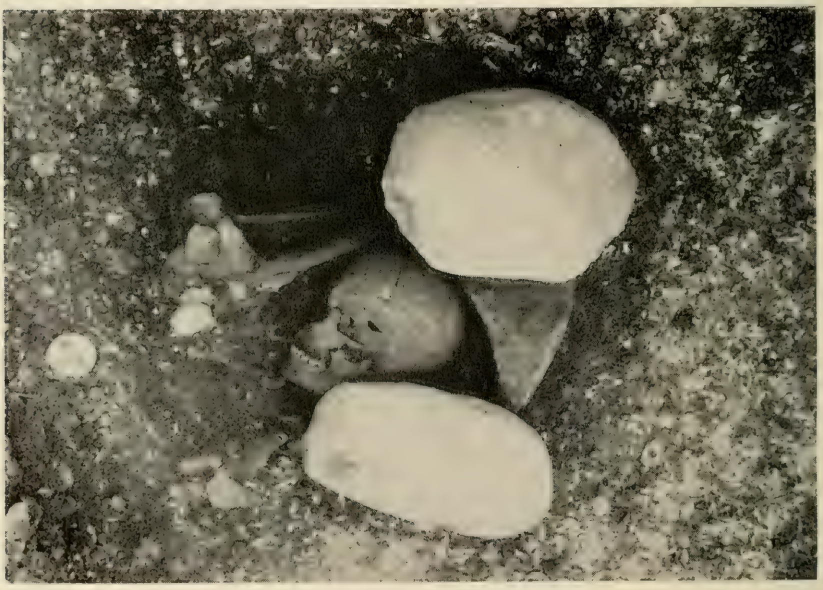
1. Burial No. 35 in Pit Intruded Through Clay Hearth. Site Ct° 27.



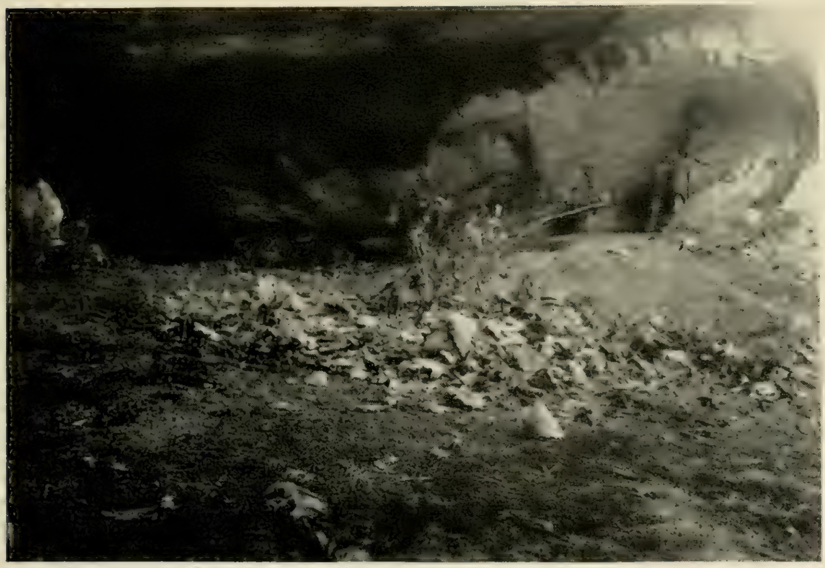
2. The Site When Abandoned. Top View From Hillock at Mouth of Mulberry Creek; Bottom View From Small Island in Tennessee River. Site Now (1938) Completely Submerged. Site Ct° 27.



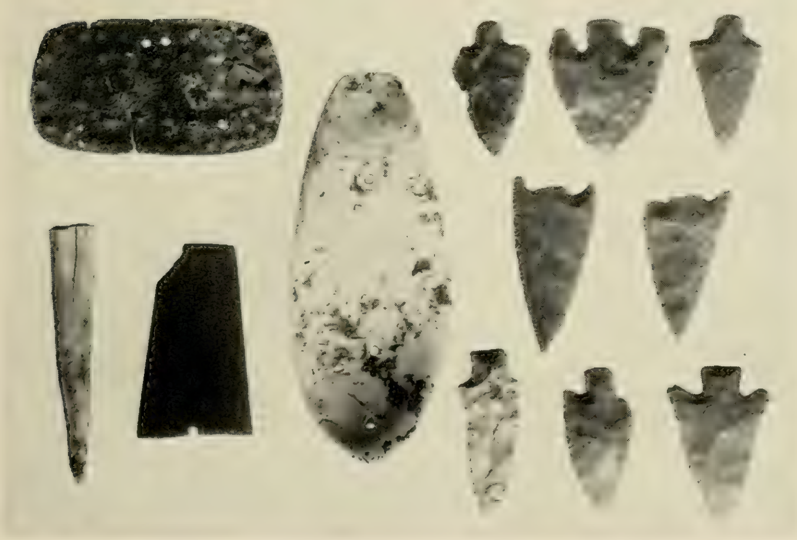
1. General View of Excavation. Site Ct° 34.



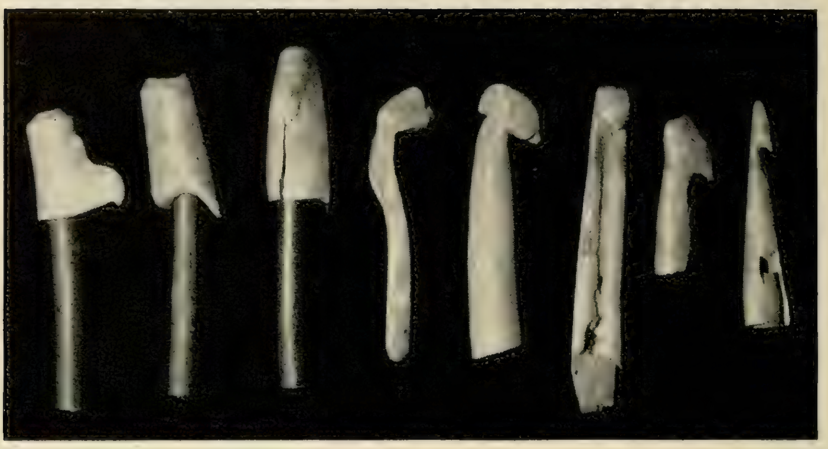
2. A Typical Sitting Burial. Skeleton No. 7. Site Ct° 34.



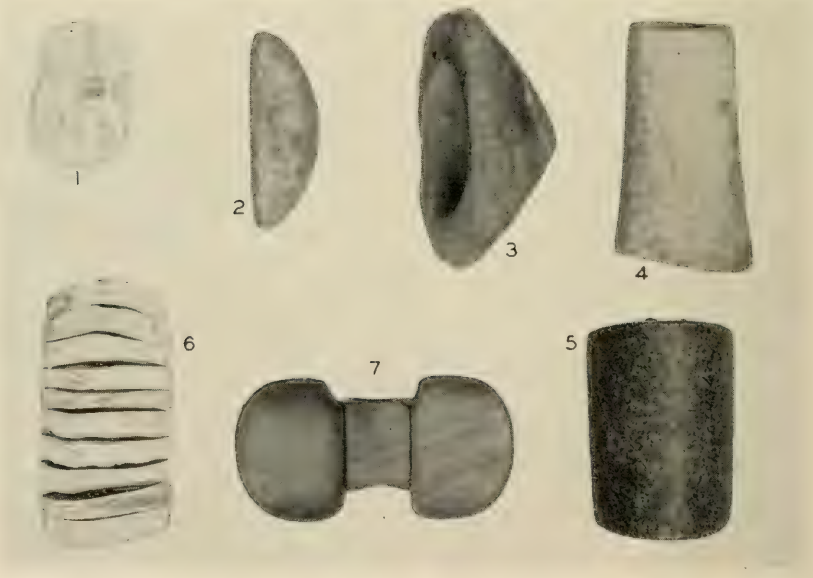
1. ENTRANCE TO GEORGETOWN CAVE. SITE CT° 42.



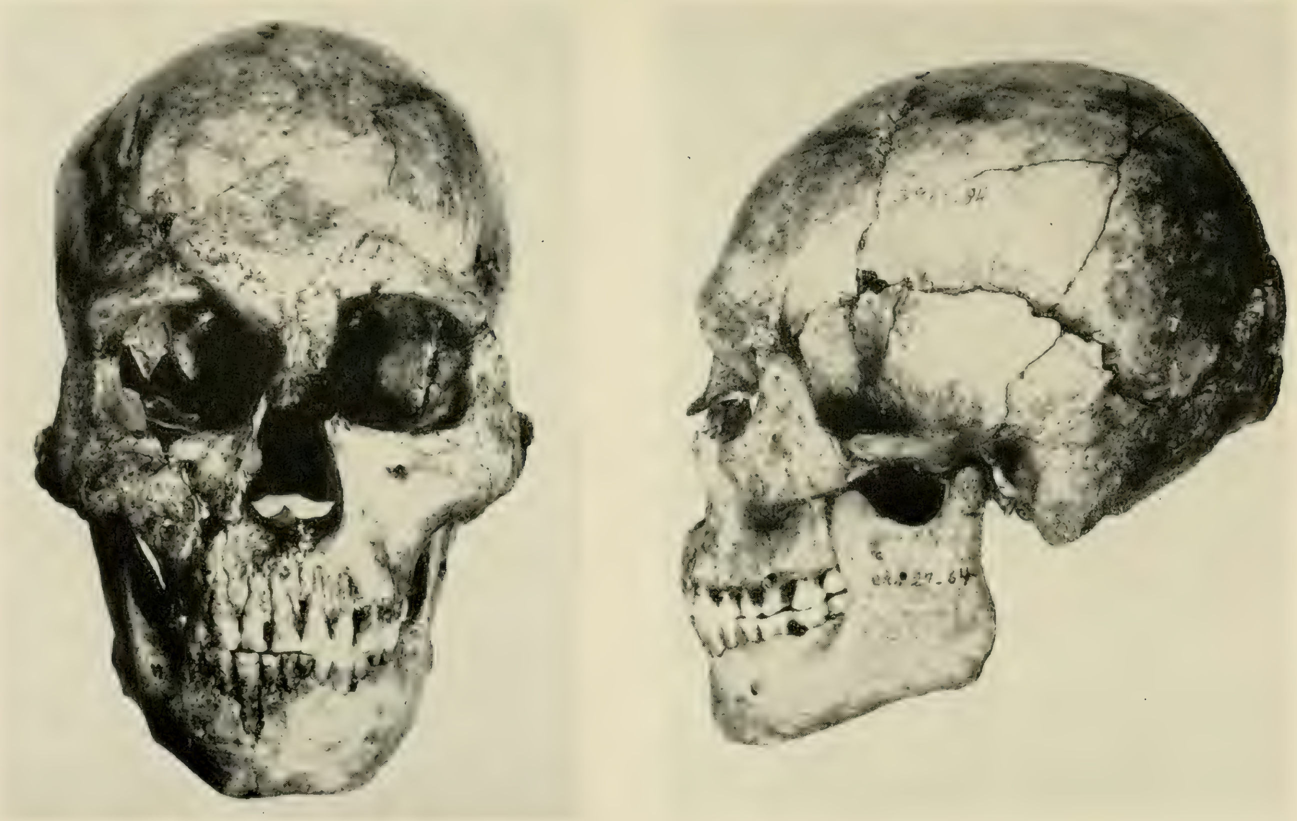
2. ARTIFACTS FROM GEORGETOWN CAVE. SITE CT° 42.



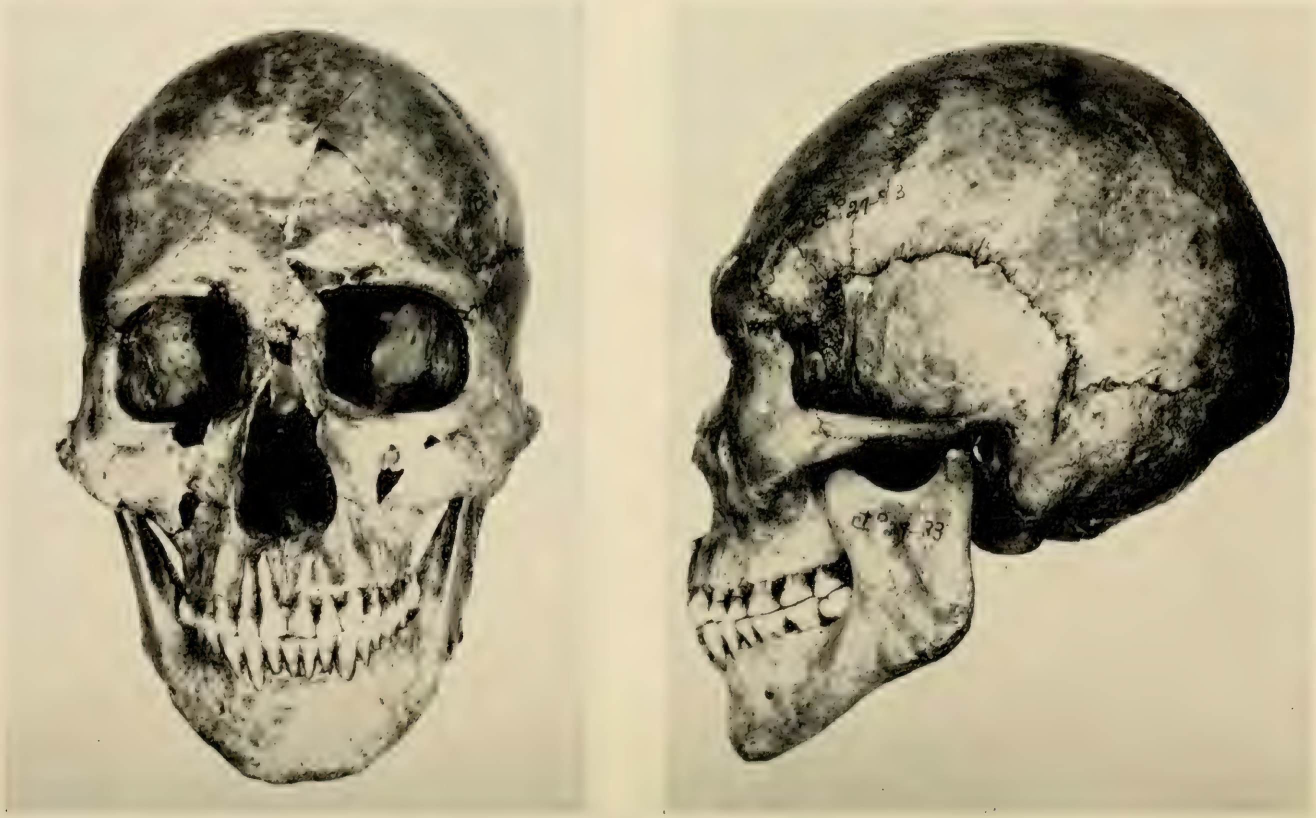
1. TYPES OF BONE AND ANTLER ATLATL HOOKS.



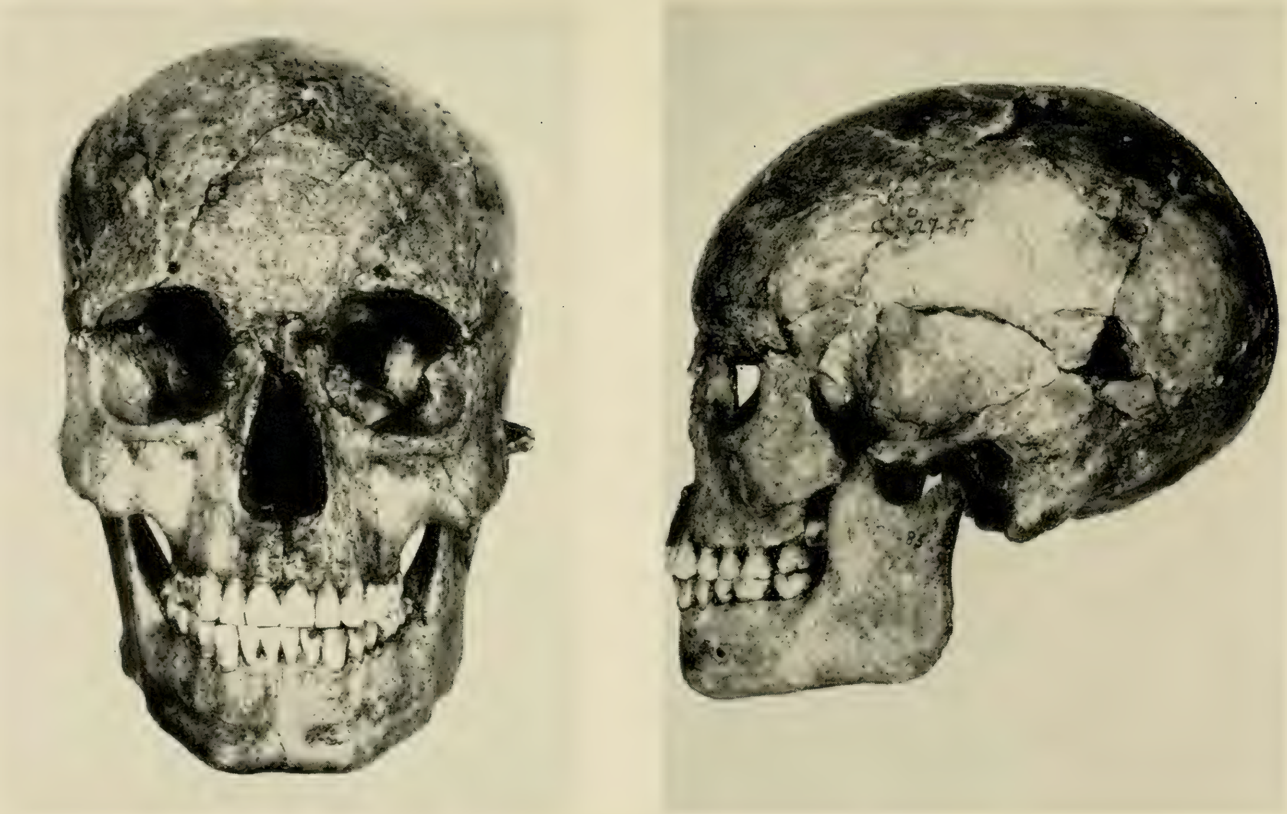
2. TYPES OF ATLATL WEIGHTS.



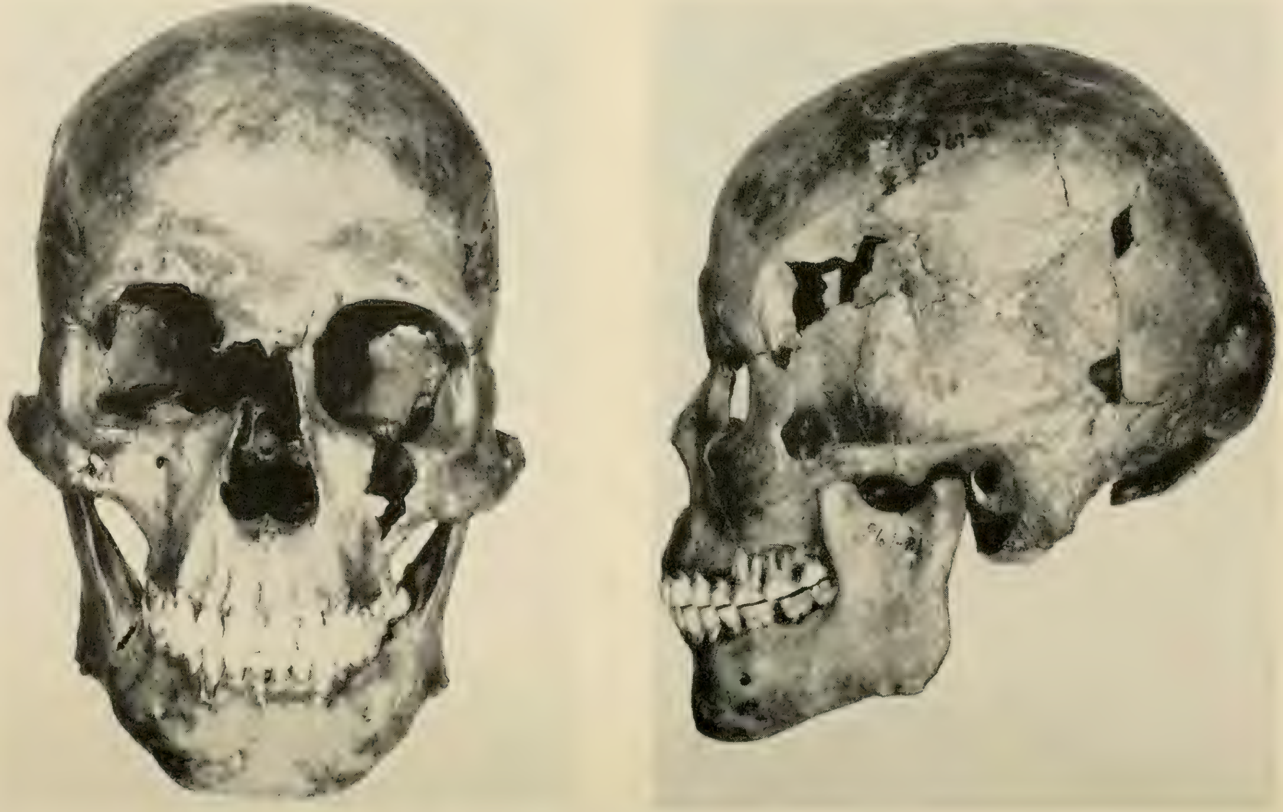
Male Cranium (No. 84) From Beneath Site Ct° 27.


Ct° 27-83
Ct° 27-83

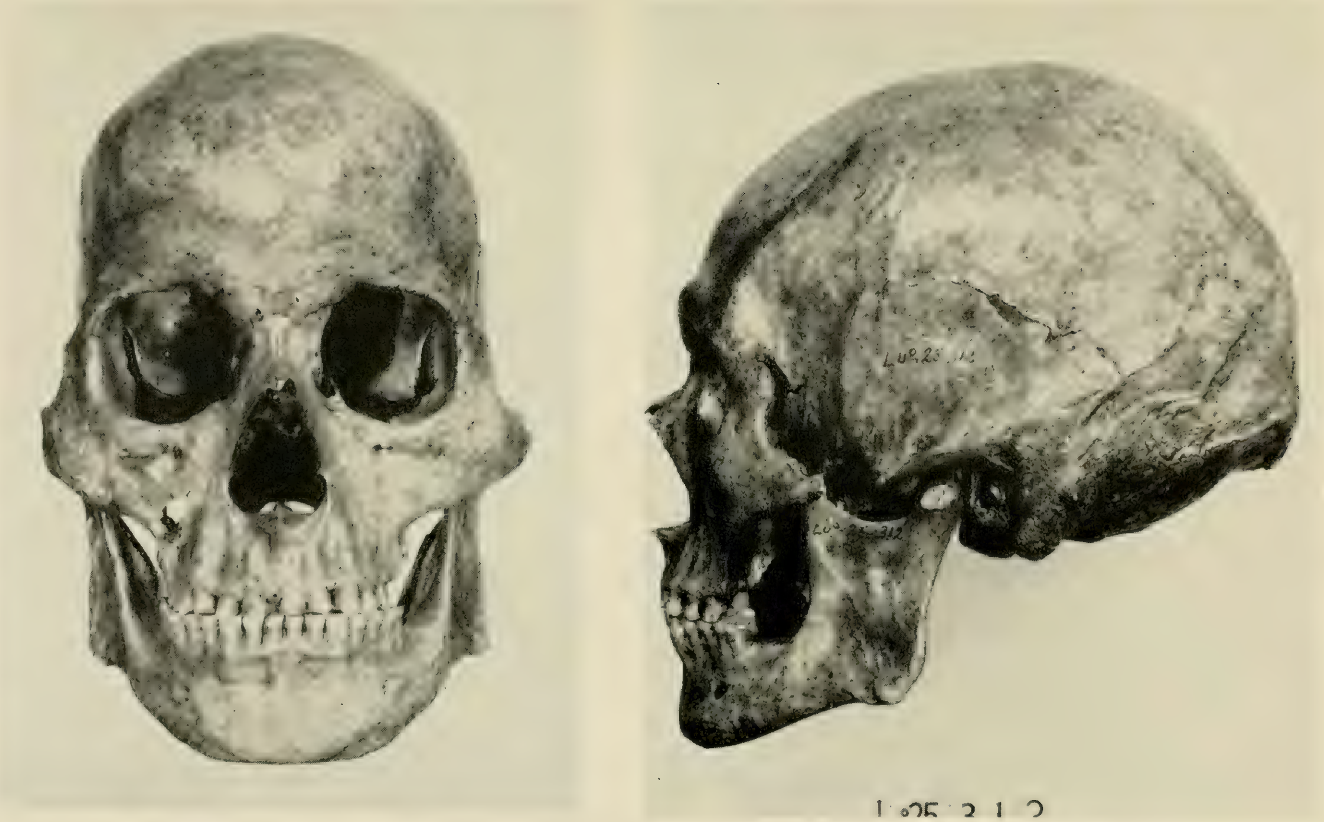
Male Cranium (No. 83) From Beneath Site Ct° 27.



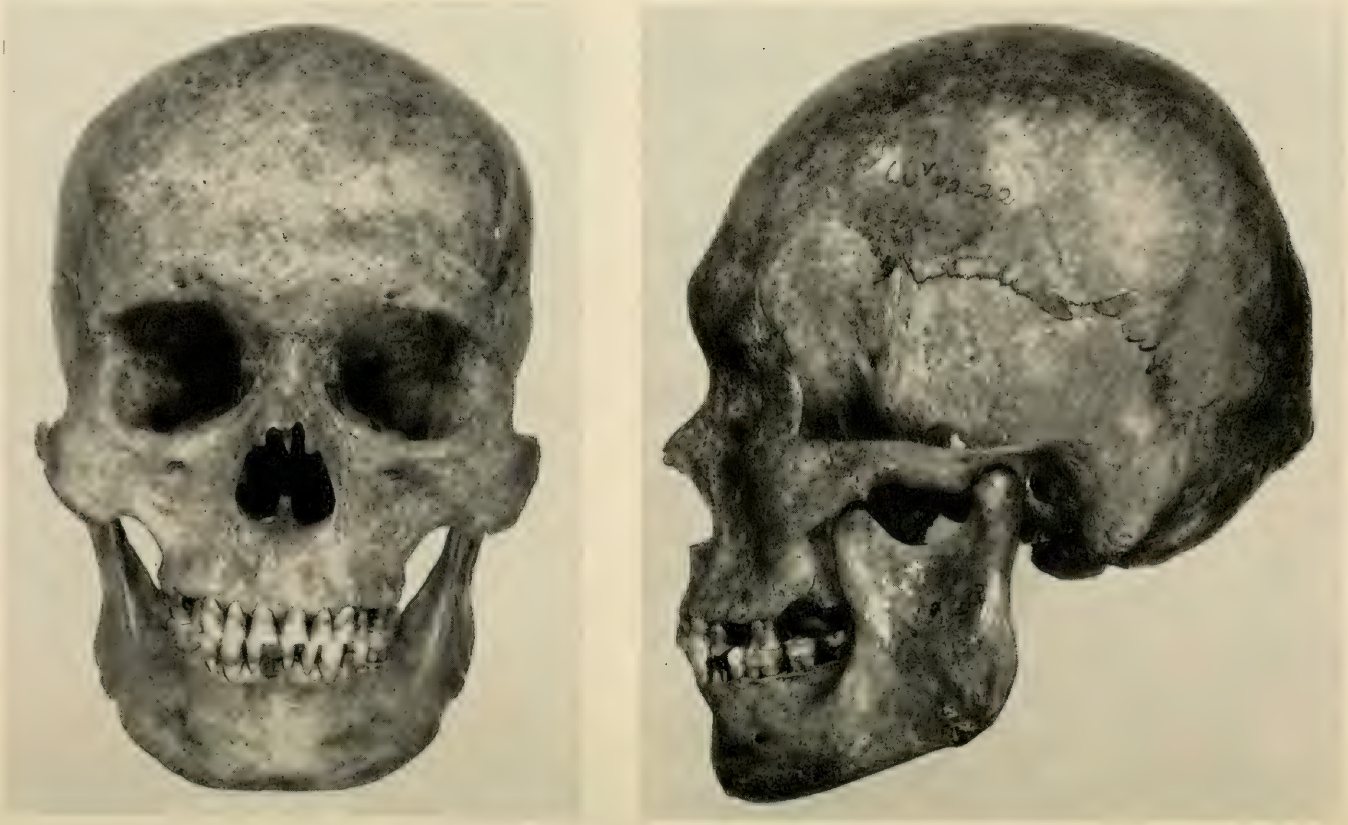
Male Cranium (No. 85) From Beneath Site Ct° 27.



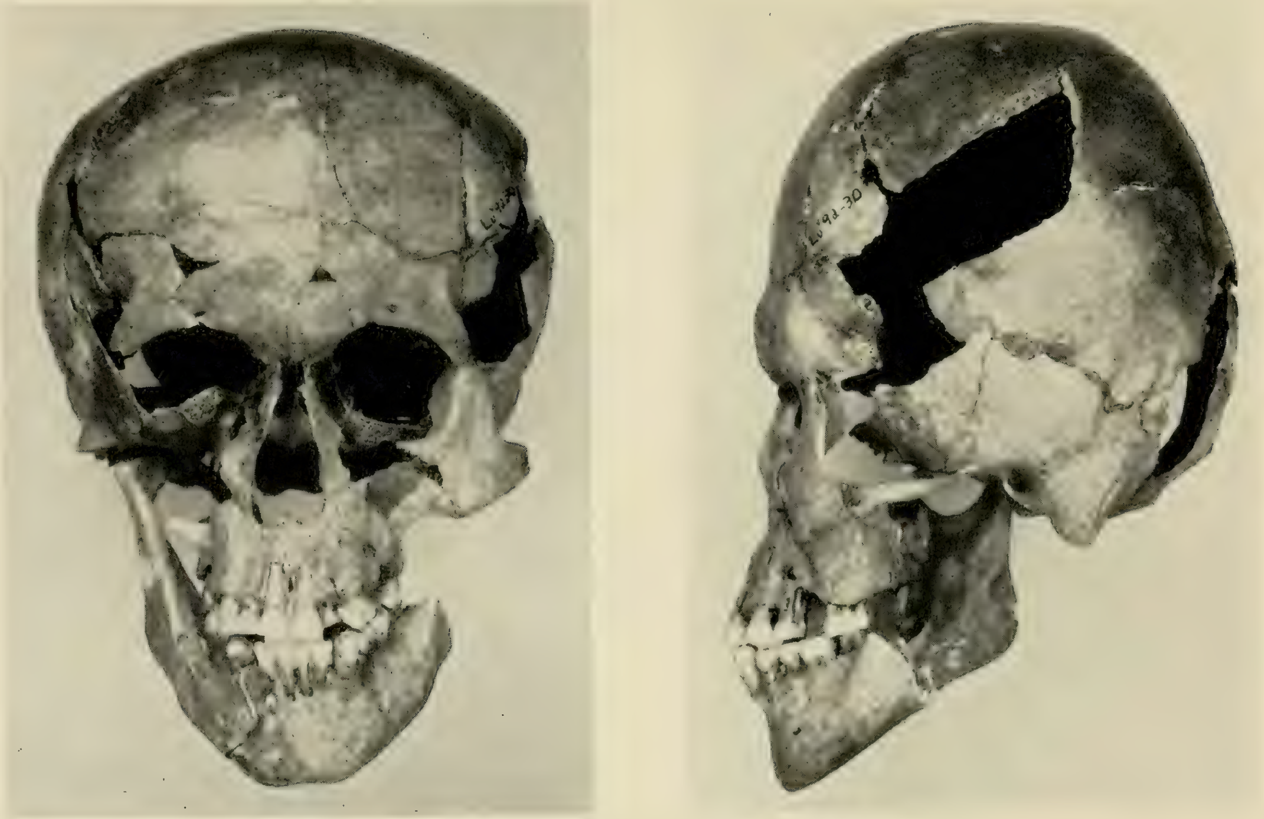
A Male Cranium From Site Lu° 67 Which Is Typical of the Small-Sized Shell Mound Variant.



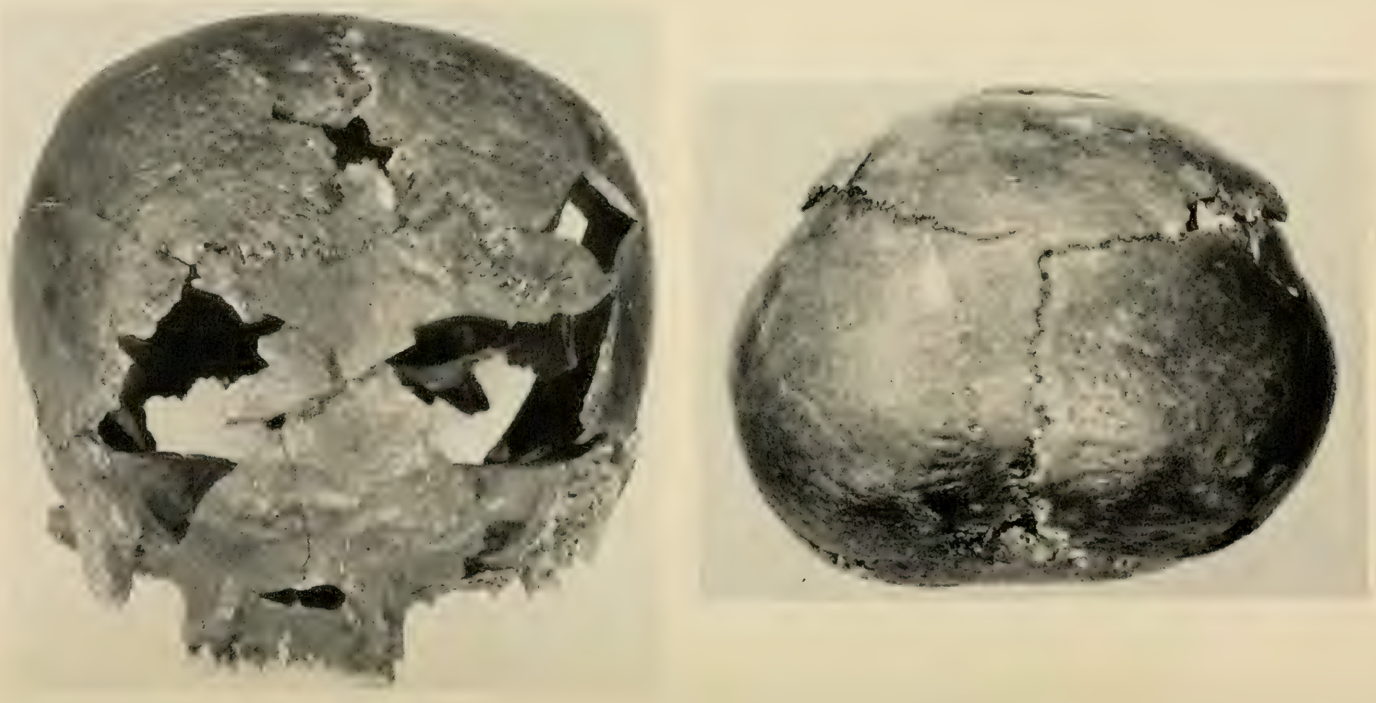
A Rugged and Excessively Dolichocranic Male Cranium of Shell Mound Type From Site Lu° 25.



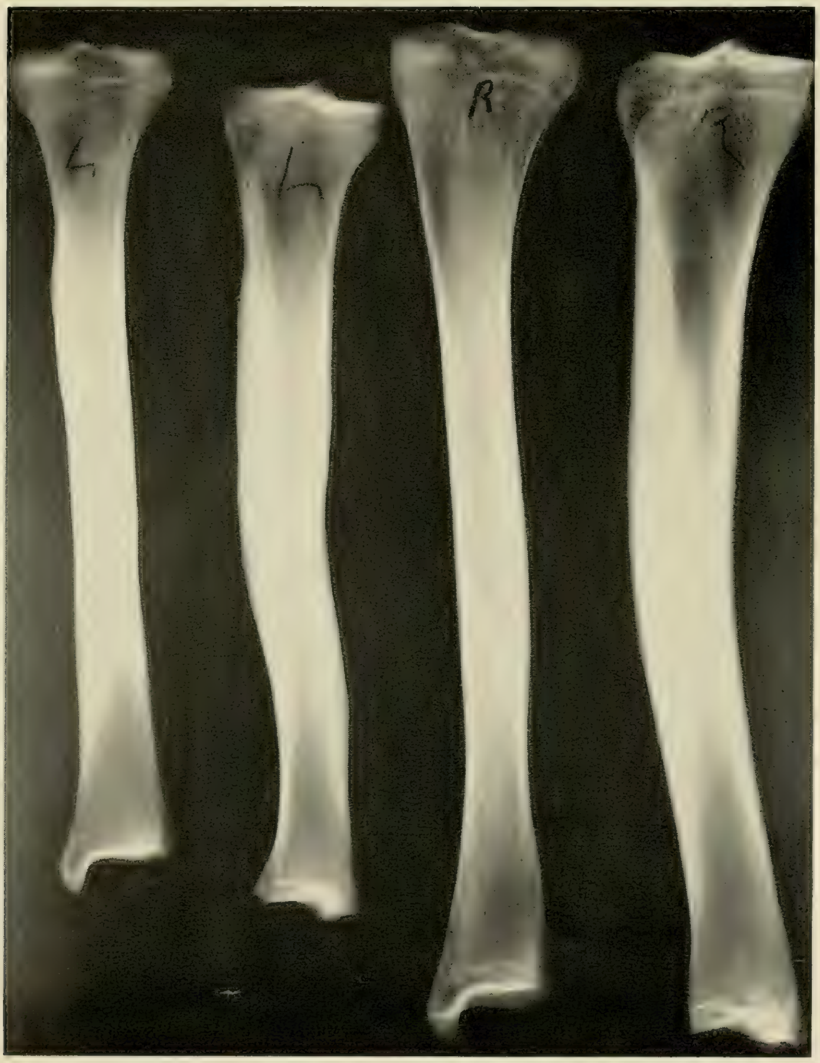
A Large Male Cranium From Site Lu^v 92 Which Exemplifies the "Koger's Island" Type.



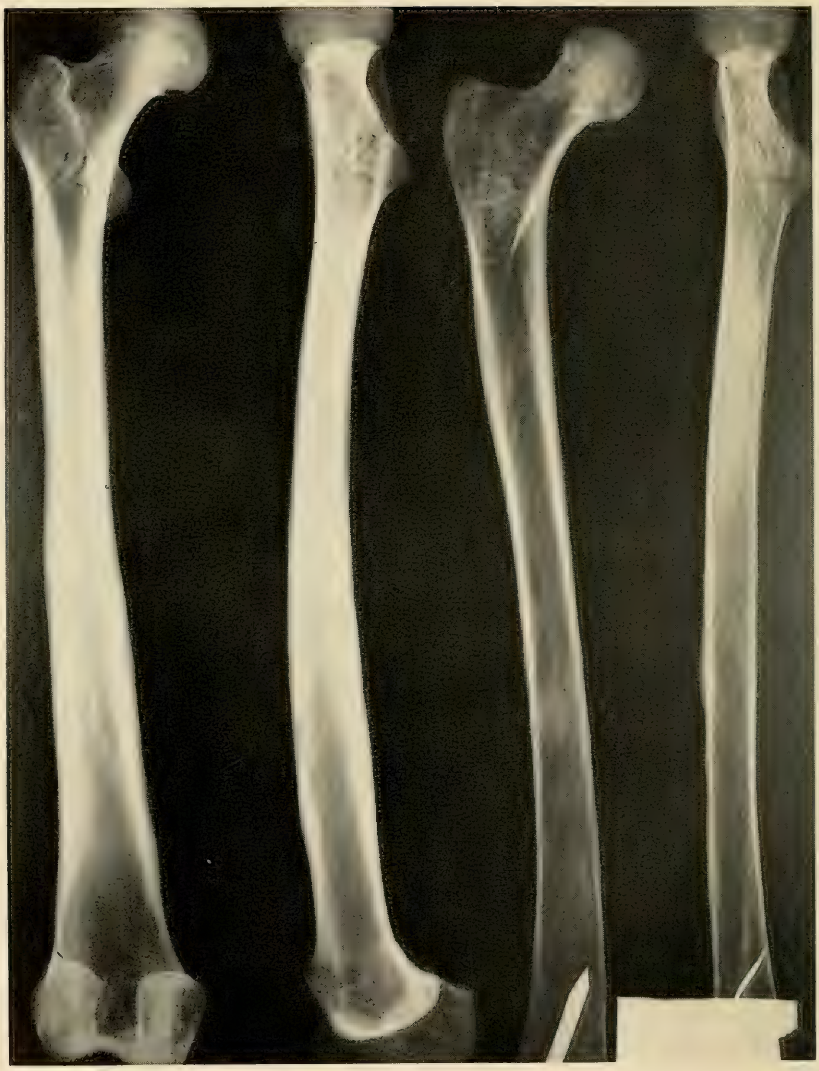
An Excessively Deformed Male Cranium From Site Lu^{v} 92.



MALE CRANIUM SHOWN IN PLATE 313, BACK AND TOP OF SKULL.



Antero-Posterior and Lateral X-Rays of the Left Tibia of Lu^{v} 92–18 (Left) and the Right Tibia of Lu^{v} 92–13 (Right) Showing Processes of Syphilitic Origin.



ANTERO-POSTERIOR AND LATERAL X-RAYS OF THE RIGHT FEMUR OF Lu^{v} 92–78 (LEFT), SHOWING PROCESSES OF POSSIBLY SYPHILITIC ORIGIN, AND OF THE LEFT FEMUR OF Lu^{v} 92–24 (RIGHT), SHOWING AREAS SUGGESTIVE OF PERIOSTITIS.

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